Study skill use, motivation and the efficacy of the "Mind Map" technique

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Contents

Abstract

The last decade has seen a considerable increase in the number of students entering Higher Education, coupled with this a lowering of entry requirements in terms of qualifications. This climate demands attention to study skill training, with particular emphasis on those students with problematic studying patterns (Entwistle et al, 1996). The present study was made up of two parts: the first part of the study used a questionnaire to investigate motivation and the frequency of use of study skills, the second part of the study involved an experiment to measure the efficacy of a study skill.

The Study Skill Questionnaire was devised to examine differences according to gender, year of study, whether the students had taken a break in their study, degree type and main subject of study. The questionnaire also examined the relationship between academic motivation and study skill use. The results showed that in particular, mature students are considerably more motivated than their peers; however, they use the same techniques with the same frequency as their colleagues.

The second part of the study continued to investigate a study skill's efficacy in an attempt to arm these motivated students with a superior learning technique. The mind map study skill was chosen for investigation. After some initial difficulty with task bias, the study showed that there was no significant difference between a self-selected technique (i.e. the study technique the student normally uses) and the mind map technique. Although this implies that the Mind Map Technique is not a superior study technique, other explanations may be possible. It could be that the technique cannot be mastered in a single session and that practice is required. It could be also possible that mind mapping only works for certain types of learners following the findings of Pask and Scott (1972; cited in Richardson, 1983). Future research could examine such possibilities.

Chapter 1

An overview of memory and learning

Introduction

In the past decade there have been considerable changes in higher education with regard to national policy and funding arrangements. This led to a considerable rise in the number of students entering university and in conjunction with this, a greater proportion of these students have been accepted with unconventional entry requirements in terms of qualifications. In recent years more students than ever before are taking 'A' levels and the grades that students are achieving are improving every year. In this climate it becomes increasingly important to provide suitable study skills training and to identify students whose studying patterns are likely to be problematic (Entwistle et al, 1996). Not only does quantity of work increase on entering university but students are expected to engage in independent study with self discipline and little external assistance in organizing their time and learning material. This change can happen rapidly, often within four months of leaving 'A' Levels (Gibbs, 1981). Recent research demonstrates that not only do large numbers of students enter university without sufficient study skills knowledge, but few provisions are allocated to remedy this problem and help them better these skills when they arrive (Wall et al, 1991).

The field of student learning is based on research from two main schools of thought: Cognitive Psychology and Educational Psychology. Cognitive Psychology employs methods such as experimentation and emphasises rigour and experimental control. The discipline seeks to try to understand the processes that are common to all people, involved in topics such as perception, memory, thinking, emotion and learning. Conversely, Educational Psychology is concerned with how individuals differ in their learning strategies and styles. Much of this educational research uses methodologies such as qualitative interviews, surveys and questionnaires to ascertain how students go about their learning (Richardson, 1987). Research into student learning develops and

extends both of these fields. Cognitive Psychology benefits from the application of its theories and procedures to a real-life activity, whereas student learning allows the development of the techniques and theories of mainstream Educational Psychology by the inclusion of the specific types of learning found in higher education (Richardson, 1987).

Cognitive Psychology

Philosophers have contemplated memory for at least 2000 years, but the scientific study of memory was only introduced around 100 years ago. Hermann Ebbinghaus (1885, 1913) employed the methods used to study perception to what he termed "higher mental processes". The methods he employed involved experimentation, strict control and measurement. This was a challenge as memory itself cannot be directly measured and researchers have to rely on the by products of learning, such as the amount of material learnt (cited in Baddeley, 1997). The information processing metaphor later dominated the field, resulting in computer analogies, such as the terms 'storage' and 'retrieval' being applied to memory. Structural approaches treated memories as traces, which could be encoded, stored and retrieved. A spatial metaphor was applied, in that traces were put in a particular location, i.e. encoding, and when the item was to be recalled, the trace would be retrieved (Medin and Ross, 1997).

The use of a unitary term may suggest that memory is a single entity, however, the following information will demonstrate that the human memory is made up of many systems as opposed to just one (Baddeley, 1997). Atkinson and Shiffrin (1971) argued that information in the memory system is held by two components: Short-term memory (STM) and Long-term memory (LTM). The Multi-store Model of memory contended that incoming information enters via the senses into sensory memory. Some of this information passes into STM where it will either be maintained by rehearsal or, if not coded, it will be displaced and forgotten. Atkinson and Shiffrin emphasised the importance of rehearsal in the transference of information into LTM and believed it to be

a crucial process for much learning. Free recall memory tests, such as those by Glanzer and Cunitz (1966), which found primacy and recency effects provided support for Atkinson and Shiffrin's model. This means information presented at the beginning and end of a list will be better remembered than the interconnecting words. The recency effect only occurs if the participant is tested immediately after rehearsal, if tested after an interfering task or even an intervening period of time whereby rehearsal is not allowed, the words are recalled at the same rate as those positioned in the middle of the word list. Thus, the recency effect relies on retrieval from STM. In the case of the primacy effect, however, distraction occurs. This is in the form of presentation of the following words in the list, and in some experiments (for example, Brown, 1958; Peterson and Peterson, 1959; Glanzer and Cunitz, 1966; cited in Gross, 1999) a distraction task is specifically used to occupy STM. Such experiments show that despite occupation of the short-term memory store, the first items encountered are recalled more frequently than the following words, thus suggesting that LTM is employed.

Other experiments into 'span measures' provide support for the multi-store model. In such studies, participants are presented with sets of random digits and the number correctly recalled determines the short-term memory span. Miller (1956) examined the span of STM, finding a capacity of "seven plus or minus two". After further investigation, he found that this capacity could be applied to 'chunks', which can be defined as integrated pieces of information (cited in Eysenck and Keane, 1998). Chase and Simon (1973) further proposed that expert chess players "chunk" the positions of pieces on a chessboard. They argued that experts and beginners differ mainly in terms of "immediate visual-perceptual processes rather than the subsequent logical-deductive thinking processes" (p.461). The players differ in the size of the chunks that they can store, thus proposing that the chunks of beginner's will be simple in comparison to the amount of information within the expert's chunks. Chase and Simon (1973) tested this by asking players to place pieces on a chessboard to match a second chessboard (already in place). This second chessboard was in sight throughout the experiment and Chase and Simon measured the amount of time players spent looking at the board and how many pieces they placed at a time. They found that only a few pieces were encoded in each

chunk, but experts took a shorter time to encode the chunks. They also found that the greater the expertise of the player, the more pieces they encoded in a chunk.

Such evidence provides support for Atkinson and Shiffrin, as the evidence demonstrates a specific short-term capacity. Long-term memory, however, has a seemingly limitless capacity, certainly one that is not measurable using current methods and instruments. Thus, two different memory spans supports the proposition that there are two memory stores. Other evidence, supporting the short-term, long-term distinction comes from brain-damaged patients. Those with Korsakoff syndrome, due to alcoholism, have poor long-term memory but almost normal short-term memory in terms of performance on free recall recency effect tasks and capacity (Baddeley and Warrington, 1970; Butters and Cermak, 1980; cited in Eysenck and Keane, 1998). However, with patients such as KF the reverse occurs. He suffered damage to the parieto-occipital area of the brain, which severely impaired his short-term memory, particularly in performance on free recall recency effect measuring tasks. This evidence conclusively supports the notion of a separate but interconnecting short-term and long-term store, but the other assumptions of the multi-store model have come into question (Shallice and Warrington, 1974; cited in Eysenck and Keane, 1998).

Eysenck and Keane (1998) criticised the Multi-store approach, suggesting that, although the model has provided an extremely useful metaphor to aid the understanding of memory, they argue that it grossly oversimplifies both the short and long-term memory systems. Shallice and Warrington (1974) discovered that KF's short-term memory deficiency only applied to verbal items and that his memory for imagery was considerably less affected, as was his recall of non-verbal sounds. This opposes the conception of a unitary short-term store (cited in Eysenck and Keane, 1998). The multi-store model has also been criticised for an overemphasis on structure, which led to a lack of focus on the processes inherent in memory. The only process emphasized in Atkinson and Shiffrin's model is rehearsal and Eysenck and Keane (1998) argue that it is highly unlikely that the huge amount of knowledge held in long-term memory was coded into the system by this method of rehearsal. It would appear that Atkinson and Shiffrin have oversimplified the role of rehearsal, at the cost of processes involved. The findings of

Craik and Watkins (1973) also oppose elements of the multi-store model. They found that even when words were rehearsed an equal number of times, their recall varied. They argued that success on free recall tasks was due to how the information was processed. They distinguished between two types of rehearsal: maintenance rehearsal and elaborative rehearsal. The former involves repetition of information in the manner it was presented, whereas elaborative rehearsal involves elaboration of the item being recalled, an example of this would be semantic recoding. Craik and Watkins argued that even if the number of rehearsals were the same, those words elaboratively rehearsed would be recalled better than those processed by maintenance rehearsal. The multi-store approach also ignores the role of incidental learning. Jenkins (1974; cited in Gross, 1999) argues that maintenance rehearsal is not a necessary condition for learning as participants who are not expecting to take part in a learning task, and thus, were not inclined to rehearse can actually recall material Atkinson and Shiffrin do not consider the effect of such processes supporting the notion that their model is oversimplified (cited in Gross, 1999).

Craik and Lockhart (1972) proposed an alternative approach to memory. They argued that a memory trace may be thought of as a by-product of the operations undertaken by the cognitive system. Trace persistence is, therefore, dependent on the how the information was processed. Craik and Lockhart believed that information can be encoded in a number of different ways, and these can be thought of as a continuum ranging from a shallow structural analysis of the item, to deeper analysis of meaning. Craik and Tulving (1975) provided support for this theory in their study into incidental learning. They presented participants with a list of 60 concrete nouns. For each word the participant was required to answer one of three types of questions, each representing a level of processing: shallow, phonological and deep. The shallow or surface level questions required participants to make a judgment on the appearance of the word, for example, if the noun was in capital letters or not. The phonological questions required participants to judge whether the word rhymed with another word, and the deep or semantic level questions required an analysis of meaning, for example, if the word would fit into a particular sentence. The questions were therefore, selected to induce the levels of processing detailed in Craik and Lockhart's theory. Each participant would answer all

of the different types of question, which were presented in an auditory fashion followed by a brief presentation of the word. Participants were then given a list of 180 words and asked to select the ones, which they had been asked a question about. Results showed that 17% of words from the shallow condition, 37% of words from the phonological condition and 65% of words from the semantic condition were recognised (cited in Medin and Ross, 1997). Thus, how the information is processed appears to have a great effect on recognition memory.

The Levels of Processing approach has attracted a great deal of attention since its publication. However, the theory has not been without its critics. Perhaps the greatest problem with the levels of processing approach is that depth cannot be independently measured or identified. To be a 'good' scientific theory, its components must be measurable and as Eysenck (1984) points out, without such measurement the argument can easily become circular. For example, if a student processes information in a deep manner, the theory states that they will learn it well. However, if a student performs well on a task it is argued that deep processing must have been used. Baddeley (1997) surmises, "there is no generally accepted way of independently assessing depth of processing. This places major limits on the power of the levels of processing approach" (p.117). The serial stages assumption also creates a problem for Craik and Lockhart. They based their model on theories of perception, which state that when a written word is encountered, it is firstly visually processed. Then as the word is read it will be phonologically represented and following this, semantic analysis will occur. Since then, research has shown that processing does not necessarily follow this sequence and that these processes may occur in parallel with information flowing in various directions (Rumelhart and McClelland, 1982; cited in Baddeley, 1997).

The term 'overspill coding' refers to the problem that when reading a word, semantic coding may take place despite the condition the participant may be in, for example when reading the word 'tomato' it may be unavoidable to process the word only in terms of its structure or sound (Craik and Tulving, 1975). Morris, Bransford and Franks (1977; cited in Baddeley, 1997) pointed out that the theory overemphasises how the information is

encoded at the cost of retrieval processes. Their study showed that in some cases information will be better recalled if it is encoded according to how the information is to be retrieved. For example, Morris, Bransford and Franks showed that phonological processing could lead to better recall than semantic processing if the retrieval required rhyme judgments to be made. Baddeley (1997) argued that despite such exceptions, the levels of processing theory is a useful 'rule of thumb'. Craik and Tulving (1975) argued that semantic coding is preferable for increased memorability but the 'richness' of this semantic coding can have a profound effect on recall. They found that when participants were asked to judge whether a word would fit in a sentence, those to be fitted into the more complex and elaborate sentences were better recalled. Anderson and Reder (1979; cited in Farrand, Hussain & Hennessay, 2002) stated that elaboration occurs when existing knowledge is linked with the new information and this association serves the function of increasing retention. Jaccoby and Craik (1979; cited in Gross, 1999) went on to discover that the more distinctive the stimulus or if it is made more distinctive during processing, the more likely it is to be recalled.

Baddeley and Hitch (1974) assessed the claims of the multi store approach and proposed that the idea of Short-term memory should be replaced with their concept of Working Memory. This essentially comprises of three components: a central executive and two slave systems: the auditory or phonological loop and the visuo-spatial sketch pad (VSSP). The main component is the Central Executive, which is modality free and deals with cognitively demanding tasks. It is of limited capacity and resembles attention. The VSSP is a specialised system for coding spatial and visual information. The other slave system, the phonological loop, holds speech based information and has the function of preserving word order. The phonological loop comprises of two sub-components, which are the phonological memory store and an articulatory control process. The phonological memory store holds traces of speech-based information, which are assumed to fade if not refreshed by the second component, the process of articulatory sub-vocal rehearsal. This process is based on inner speech; it is a means of access to the phonological store and is linked to speech production. The phonological loop is also concerned with sub-vocally naming visually presented information (Baddeley, 1997). Thus, words presented in a

visual form will be processed differently from those in an auditory form. Those presented in an auditory fashion will have direct access to the phonological store regardless of whether the articulatory control process is occupied. If words are presented visually there is only indirect access to the phonological store via the articulatory control process, which can be thought of as sub-vocal articulation allowing then the information to be stored in a speech based form (Baddeley, 1997).

There are four phenomena cited by Baddeley (1997), which provide support for the existence of the phonological loop: the phonological similarity effect, the unattended speech effect, word length effect and articulatory suppression. Conrad and Hull (1964; cited in Baddeley, 1997) found that words or letters that sound similar to each other are more difficult to remember and this phenomenon is known as the phonological similarity effect. According to Working Memory, the phonological store is based on phonological codes and the more alike two items sound, the more difficult it will be for the store to discriminate between the two codes. Colle and Welsh (1976; cited in Baddeley, 1997) also investigated the phonological loop. They performed an experiment whereby participants were presented with a series of visually presented numbers and were asked to repeat them back to the experimenter. Colle and Welsh found that the sound of someone reading a passage of text in a foreign language, whilst the experimental task was taking place, interfered with the task. This 'unattended speech effect' indicates that the irrelevant speech is fed into the phonological store and corrupts the memory trace. Baddeley, Thompson and Buchanan (1975) found that more short words could be remembered than long words, in tasks that require immediate serial recall. They found that there was a specific period of time, which determined the memory span. The longer words take a greater amount of time to rehearse than short words, thus using up more of the memory span, so fewer words will be recalled. Articulatory suppression is the final phenomenon to be presented as evidence for the phonological loop. Despite the fact that overt speech is not necessary for the process of sub-vocal rehearsal, if an irrelevant sound is repeated continuously, the span of the phonological loop will decrease significantly (cited in Baddeley, 1997). In summary, the above four phenomena clearly support the concept of the phonological loop. The phonological memory store is supported by

studies into the irrelevant speech effect and the phonological similarity effect and the process of sub-vocal articulation is also supported by studies into word length and articulatory suppression. The phonological loop appears to be extremely valuable for our functioning, it increases memory span, facilitates the reading of difficult material and can preserve word order to assist in comprehension. The loop also assists understanding as it gives us information about stress patterns and rhythm in sentences (Baddeley, 1997).

The second slave system proposed in Working Memory is the visuo-spatial sketch pad. It is a system for formulation, manipulation and temporary storage of visual and spatial information, which can be used in the same way as somebody would use a pad of paper to figure out a geometric puzzle (Baddeley, 1997). Atwood (1971) carried out an experiment, whereby participants were presented with phrases, which were either: image evoking, for example, "nudist devouring bird", or abstract, such as "the intellect of Einstein was a miracle". After the sentence was presented, the participants were given a classification task whereby they were presented with digits, either in a visual or auditory form. Atwood found that when digits were presented visually, the image-evoking phrase disrupted recall of the digits much more than the abstract phrase. Conversely, when digits were presented in an auditory fashion, the abstract condition was the main distracter (cited in Baddeley, 1986). Brookes (1968; cited in Baddeley, 1986) also investigated the effect of distraction. Participants were allocated into one of two conditions: a non-verbal condition and a verbal condition. The non-verbal condition involved participants being shown an image of a three dimensional capital letter, which they were then told to hold in their "mind's eye". Starting at the bottom left hand corner of the letter, the participants were told to follow the edge of the letter in a clockwise direction. Each time the participants reached a corner, they were asked to respond, saying 'yes' if the corner was at the top of the letter, and 'no' if not. The verbal task involved participants being given a sentence, for example "the bird in hand is not in the bush". The participant was required to take each word in the sentence in turn and stating 'yes' if the word is a noun and 'no' if not. Regardless of the condition, Brookes gave the participants two ways in which they could respond: either spoken response or by manually pointing to 'yes' and 'no' on a table. Brookes found that responding manually

disrupted the visual task more than the verbal task. In line with this, the verbal task was more disrupted by the spoken response.

Baddeley (1974, cited in Baddeley, 1986) replicated this experiment using the same visual and verbal task from the Brookes' study. However, a 'pursuit rotor' was included, whereby the participant had to follow a spot of light around a circular route, without taking their eyes of the light. The participants were told to concentrate on getting the verbal or visual tasks correct and the amount of time the participant followed the pursuit rotor was measured. Results concluded that the visual task disrupted the pursuit rotor task significantly more than the verbal task. So, the findings of Brookes and Baddeley both seem to support the notion that there is a separate visual memory system. Baddeley's (1974) experiment demonstrates that the occupation of visuo-spatial memory can disrupt tracking performance, however, Baddeley went on to examine whether the reverse is possible, i.e. if tracking can disrupt visual memory.

In this experiment Baddeley (1974, cited in Baddeley, 1986) used a technique designed by Brookes (1967), involving a four by four matrix on which, the second square on the second row was to act as the starting point. Participants were given a set of statements, which they were required to repeat back to the experimenter. There were two conditions: the first condition involved statements containing spatial adjectives, which allow a route to be plotted onto the matrix. The second condition involves the same statements, but the spatial adjectives are replaced with non-spatial words, for example the words 'left', 'right', 'above' and 'below' are replaced with 'slow', 'quick', 'good' and 'bad'. An example of the statements to be repeated would be: "put a 1 in the starting square, (condition 1) in the next square to the right put a 2, (condition 2) in the next square to the quick put a 2". These statements were read at a rate of 2.5 seconds per item which allowed the numbers to be spatially placed in the first condition but did not allow time for the kind of arbitrary coding that would be required for the non-spatial words to be coded in a spatial manner (cited in Baddeley, 1986).

The findings of both Baddeley and Brookes indicated that in control conditions participants performed better in the spatial words condition rather than the nonsense sentence condition. It was found that on average, for every 8 spatial items remembered, an equivalent of 6 non-spatial items could be remembered. However, when the pursuit rotor tracking task was to be performed at the same time, participants in the spatial words condition performed significantly poorer than in the control condition. Baddeley (1974, cited in Baddeley, 1986) argued that the tracking disrupted the visuo-spatial sketch pad in the spatial words condition, whereas the nonsense sentence condition remained unaffected as tracking has no effect on rote verbal memory.

Baddeley and Lieberman (1980) suggested that such findings could be due to visual imagery, however, it is also possible that such findings could be explained by spatial imagery and a non-visual code. To investigate this, the researchers used the Brookes matrix task as described above, with two secondary tasks, which could potentially disrupt processing. The first was a spatial but not visual task, and the second was a visual task with little spatial processing. This experiment involved two main conditions: the 'pit and pendulum' non-visual and a visual condition involving a series of brightness judgments. The former involved spatial but not visual processing as the participants were blindfolded. A pendulum was attached to the ceiling, which contained a device, which omitted a constant tone. The room was darkened and the participant's task was to follow the pendulum as it swung, with a torch. When the torch shines directly on the pendulum, a photosensitive receptor will cause the tone to change pitch. Therefore without visual input the participant can do a spatial task receiving auditory feedback. The latter condition involved participants also being seated in a darkened room. However, they were presented with two different brightnesses on a slide projector, which they had to distinguish between (i.e. press a button when presented with the brighter one of the two). Participants in both conditions were allowed to practise the secondary tasks. Then the secondary task was to be combined with the Brookes matrix task. As predicted the pendulum task significantly disrupted the spatial words condition of the matrix task but not significantly in the nonsense sentence condition. The brightness task however, disrupted nonsense sentence condition more than the spatial condition (cited in Baddeley,

1986). The findings are interpreted as evidence for a distinction between verbal and visual memory code. The research supports Baddeley's notion of the two slave systems of working memory. However, Logie (1995; cited in Baddeley, 1986) suggested that the VSSP is made up of two partially separate systems: the Visual Cache, which is concerned with visual form and colour; and the Inner Scribe, which is concerned with spatial and movement information. The final component proposed by Baddeley is one, which governs the VSSP and Phonological Loop: the Central Executive.

The Central Executive is the most important component of Working Memory as it is responsible for the allocation of attention. Research has demonstrated that participants can store a string of digits in some kind of short-term store, whilst undertaking complex reasoning, learning and comprehension tasks. This indicates that there must be a separate storage system where information can be held whilst more complex processes occur. Thus, that there might be some kind of subsystem(s) controlled by a central processor (Baddeley, 1986). The Central Executive is very flexible and can process stimuli from any of the sense modalities. However, there is a general consensus it is the least understood component and Eysenck (1986, cited in Gross, 1999) argues that this is the greatest limitation of the Working Memory model. Baddeley (1981; cited in Gross, 1999) responded to such criticism by suggesting that rather than a component, the Central Executive should be thought of as an "executive system" with a number of sub-components. Although of limited capacity, this has been difficult to measure and as Baddeley (1986) points out despite claims of being 'modality free' and used in various processing operations, the exact constraints on the functioning of the central executive are not clear.

Paivio and Caspo's (1969; cited in Eysenck and Keane, 1998) research into imagery is relevant to Short-term Memory. In the introspection period, there was great focus on imagery, however, the arrival of the behaviourist era lead to little research being carried out, as internal mental processes were not thought to be fit for scientific study. In the past 40 years, however, a corpus of research has been conducted. Paivio became one of the more notable researchers in the field of imagery. He discovered that words are more

likely to be recalled if an image is created. Paivio (1986; cited in Eysenck and Keane, 1998) suggested that understanding mental representation might be the most complex challenge faced by the sciences. He put forward a dual coding theory, which is based on representations. These come in many forms; there are external representations, examples of which would be writing or a drawing of an object, and there are also internal or mental representations. These mental representations are further split into two forms: analogical and propositional. Analogical representations are concerned with mental images. The classic example is the visual images but people also have images based on information received from other sense modalities and may be visual, tactile, olfactory or kinetic. Propositional information is based on the more abstract concept of language but not the words themselves. They hold ideas from information from any sense modality regardless of how the information was encountered. They are based on rules as is language but unlike language, the propositions themselves tend to be unambiguous and distinct entities. An example of a proposition would be ON(PEN, CHAIR), i.e. the pen is on the chair. This refers to two specific objects and the relationship between them (cited in Eysenck and Keane, 1998).

Paivio's work examined the differences between propositional and image based representations. His dual coding theory identifies two separate but interlinked systems for processing and representing information. The first processes information in a verbal form, and the second in a non-verbal image based form. These two systems can be further broken down into subsystems each based on the senses (i.e. auditory, visual, haptic) although the verbal system does not deal with olfactory and taste memories). The verbal system is made up of units called logogens and the imagery system is made up of units called imagens and both of these have modality specific versions (i.e. such as visual, auditory etc). Paivio defines a logogen as a unit, which "can function as an integrated, informational structure or as a response generator" (1986, p.66). An example of one would be to take the word "duck". The logogens would identify the spoken sound of the word and its visual form ("d-u-c-k"). The imagens identify and represent images. There are three main types of empirical support for Paivio's dual coding theory: the effects of dual coding on free recall tasks, neuropsychological evidence and interference

with a single system. To examine the effects of dual coding on free recall, Pavilion (1971; cited in Eysenck and Keane, 1998) conducted a study whereby participants were given words and pictures to learn. The presumption was made that if the pictures were of concrete items then they would name them (sub-vocally) and look at the picture, thus, indicating that both the verbal and non-verbal systems were in use. It was also presumed that if the participant is given a word to learn and this is not imaged, the word will only be processed verbally. According to such presumptions, coding for pictures should be more successful as both systems are being put into use. Paivio (1971; cited in Eysenck and Keane, 1998) found this, to such an extent that he argued that images are superior mnemonics.

Eysenck and Keane (1998) point out that for most people the left side of the brain processes language-based material and the right side is usually involved with non-verbal tasks. Although Pavilion did not believe that the systems were localised in different hemispheres, he believed that they were localized to some extent. Experiments have shown, however, that abstract and concrete words are processed differently. Abstract words are processed better when presented to the left hemisphere (via the right visual field), whereas concrete words tended to be processed and recognised to an equal extent in each hemisphere. This evidence supports Paivio's concept that there is a dual coding system because, as mentioned above, concrete words may be learnt using the two systems: by verbal processing and by imaging the word. Abstract words, however, can only be processed verbally. So following this argument, the localization of verbal processing in the left hemisphere, when presented with abstract words and by deduction the localization of visual image based processing in the right hemisphere supports the notion that there are two systems for coding.

Other researchers focusing on imagery examined mnemonic techniques many of which are based on Paivio's dual coding principle. Mnemonics are also a key area of Cognitive Psychology involved in student learning. They can be defined as techniques for improving memory but the term is often reserved for techniques that appear slightly bizarre or artificial to the inexperienced user. The techniques are normally used in order

to provide meaning or organisation to unfamiliar or unconnected material. The mnemonic itself usually has little to do with the material to be learnt but acts as a means of connecting the information (Morris, 1990; cited in Baddeley, 1997). Hunter (1977) points out that mnemonics are very specific solutions to specific problems, which requires their users to understand the learning material in terms of perceptible and image-evoking properties and connections. Eaton (1940) produced a list of 6000 words and locutions in the four dominant European languages (English, French, German and Spanish) and arranged them in order of frequency of use. Out of the top 1000, 500 were concerned with sensory perception. Of these, 480 have visual connotations, only 50 have auditory connotations, and 430 refer to touch and body-sense. On the other hand, there were no words denoting pain, smell, taste or temperature. So it would seem that when we speak about thought processes, people use words that focus on spatial perception and movement (cited in Hunter 1977). Hunter (1977) points out that most people can recount examples of mnemonics that they have used to help them learn. Examples include the method of loci, the pegword technique and the keyword mnemonic.

The method of loci or 'memory walk' has been a popular mnemonic since the first century. The 'loci' are visualisable places, for example, in a large house with many rooms or a familiar journey. At each locus a piece of material to be learned can be linked with the place. The items to be learnt are paired with the order of the loci on the 'journey', thus constructing an order, which allows recall in a particular sequence. Certain conditions are essential: the item to be remembered must be transferred into an image and the items themselves must not be presented too quickly or the participant will not have time to encode the image. Morris (1990; cited in Baddeley, 1997) argues that the method of loci is successful because it links unconnected information using easily accessible cues, which can be searched systematically during recall. The visual image forms a link between the location and the item to be recalled allowing a spatial relationship to formed. The peg word system is another successful example of pairing and mental imagery. It is based on the same principle but instead of loci, the material to be learnt is paired with a particular image. One of the most popular peg word systems is the 'one is bun' system. The numbers 1 to 10 are rhymed for example: one is bun, two is

shoe, three is tree, etc. The words to be remembered are turned into mental images and are then associated with the rhymed word (e.g. bun or shoe). So, if the first word to be remembered was happy, one would imagine a bun with a smiley face on it. Similarly if the second word was carrot, one could imagine a carrot growing out of shoe (Eysenck, 1998). Bower (1972, cited in Bellezza, 1978) argued that there are three necessary conditions for successful peg word mnemonics and as the method of loci and the peg-word system are based on the same principles, the same principles will be discussed. The first indicates that a clear learning strategy must be present. The second is that the words to be recalled and the peg/locus must be linked by visual imagery. "The reason for this seems to be that sets of verbal materials must be encoded with respect to the things they represent in order to be best remembered. Perceptions of things seem to be more easily retained in memory than perceptions of verbal symbols, collateral visual imagery may be taking place" (Bower, 1972). The third step proposed by Bower is that familiar cues are better than unfamiliar ones. Another example of a mnemonic is the keyword technique. This is based on the assumption that information may be verbally coded or coded into images. It requires two stages: the first involves associating the unfamiliar word with a familiar keyword. An example of this technique for learning medical terminology, would involve associating the term 'gastr' (which relates to the stomach), with something familiar to the participant such as a 'gas truck'. After the pairing of these two words, the next stage involves forming or being presented with an image linking the unfamiliar word with the keyword (e.g. a gas truck containing a large stomach). Therefore, the unfamiliar word is paired with its meaning (Vaughn 1981, cited in Trout-Ervin, 1990).

There is a corpus of research into the effectiveness of mnemonics. Hunter (1977) points out that it is important for the learner to understand the material fully before applying mnemonic techniques. Trout-Ervin (1990) tested the keyword mnemonic as a means of helping college students learn medical terminology. An experiment was conducted, which measured the retention rates for technical terms, from three conditions. The first condition, which acted as a control, employed traditional methods of study involving a lecturer explaining the terms and their meanings. In the second condition, the keyword technique was taught in a classroom setting. Participants were presented with slides and

taught the technique in groups, using an instructor. The third condition involved individual tuition of how the keyword approach worked, whilst participants sat in booths, hearing their instructions through headphones. The results indicated that classroom keyword mnemonic learning is advantageous over traditional methods of lecturing, as students in the former group gained higher results on the medical terminology tests. There were no significant differences between group and individualized learning so the two groups were pooled.

Raugh and Atkinson (1975; cited in Merry, 1980) examined the efficacy of the keyword technique when learning vocabulary for a foreign language. They found that the participants using the technique for vocabulary tests scored 88% in contrast with a control group, which achieved only 28%. Merry (1980) investigated the keyword technique, whilst teaching children a foreign language, using an experiment with five conditions. The first two conditions were controls: the first to ensure that the pupils could not simply guess the meaning of the words without training, and the second to examine the efficacy of the techniques participants' normally use for learning vocabulary lists. Another condition examined the efficacy of rote rehearsal and the final two conditions instructed participants to use the key word method as detailed above and were split into the "image group" and the "pictorial group". The image group took part in a short discussion about forming pictures in the mind and were then given examples of how to associate the pairs and form an image. The pictorial group followed the same process but a picture of the image was presented in a line drawing. Merry found that the most prevalent strategy in the control groups was rote rehearsal. The results showed that participants who used repetition scored lower than those using the keyword method. Overall results indicated that the pictorial group achieved the highest scores, followed by image group. However, Jamieson and Schimf (1980) found that self-generated images are more effective mnemonics than externally produced images.

Merry highlights the problem of interference with the keyword mnemonic. He likens it to a 'false friend'. One example would be where the keyword and the translation are remembered wrongly. He cites the French word 'travailler', which means 'to work',

whereas participants assumed that it meant to travel. The other example of interference is when the wrong meaning is taken from the image link rather than the keyword, for example 'tomber', which means 'to fall' and the mnemonic was tom thumb falling over, however, participants remembered the word as being 'small'. Merry does point out that both kinds of interference are rare and research indicates that the more the participant practises, the less likely it is that errors will occur (Atkinson, 1975, cited in Merry, 1980). Merry (1980) argues that "the keyword mnemonic is not being advocated as suitable for all new material...It is not intended to replace the presentation of new items in a variety of contexts or the use of other methods but can be seen as another technique, and apparently an enjoyable and highly effective one, to be added to the teacher's existing repertoire" (p.135). Hunter (1977) argues that the basic objection to mnemonics is that it involves the comprehension of information in terms of connections and properties which allow restricted access to the information at a later date, however, the information is not made available for more flexible use in productive thinking. Hunter also suggests that it may be possible to set up a vicious circle whereby the more mnemonics are used the more they are needed to learn. He also notes the difficulty of a mnemonic being remembered wrongly as there is no argument to support it, as there would be with normal learning.

Tess, Hutchinson, Treloar and Jenkins (1999) examined the superiority of bizarre imagery when compared with common imagery. They presented students with slides containing pictures of poets from the romantic era, which they were then asked to recall. The first group was presented with slides of poets in ordinary attire with the exception of Byron, who was dressed in a flamboyant, bizarre manner. The control group was presented with slides of poets in ordinary attire. Tess et al (1999) found that participants in the bizarre imagery condition recalled significantly more poets than in the control group. This study not only supports the hypothesis that bizarre imagery is a superior mnemonic but also supports the theory that bizarre imagery enhances recall when embedded in a mixed list design. Therefore, the bizarre nature of Byron's presentation not only increased the memorable-ness of him, but also for the other poets in the list with him.

Psychologists such as Jenkins (1974) and Neisser (1976) have argued that due to the amount of training that is needed before engaging in many mnemonics, the study of them would not bring a great deal to the study of natural memory (cited in Bellezza and Reddy, 1978). Bellezza and Reddy, however, disagree, arguing that mnemonics are far too effective to be discounted. They argue that although it is not clear why training is needed in mnemonics, that mnemonic devices work in the same way as natural memory. Belezza and Reddy attempted to take the method of loci and make it work in the same way as natural memory. This was to be done in two ways: the participant would not be informed that they were learning the words that they were presented with, and also the loci used would be from the participants everyday environment. Instead, participants were asked to rate visual images in terms of vividness on a 1-7 Likert type scale. There was no mention of recall. The experiment had three conditions: a familiar cues condition, and two control conditions: a "no cues" condition and an "unfamiliar cues" condition. This involved the presentation of a list of loci from a story about a foreign city called "Newopolis", this was to determine whether unfamiliar cues could be as effective as familiar ones. In the familiar cues condition, participants were asked to list 20 distinct locations that they encountered on their journey to the Psychology department. The participant had to rate each one on the vividness scales and then 20 words were presented. Each word had to be matched with the corresponding number of each locus on the list. The participant had to then combine the image of the word to be learnt with the image of the location. The vividness-rating test was applied, once again, followed by an interruption task. Then, the participant had to remember as many of the 20 words as possible, whilst trying to maintain the order they were presented in. This free recall task was followed by a cued recall task, whereby the list of 20 loci was presented to the participant, and once again they had to recall the 20 words.

In the unfamiliar condition, the participants were presented with a list of loci from a foreign city called Newopolis. The participants were given a story to read which featured 20 different locations to be imagined, at various points in the story. They were listed on a separate sheet and acted as a replacement for the 20 loci from the journey to the

Psychology laboratory, but otherwise the experiment continued as above. The no cues condition was set up to ensure that the findings were not a result of other methods, such as serial learning and to ensure that the images themselves were not sufficient for effective recall. The participants in the no-cued group followed the first part of the procedure that the familiar cued group underwent. They listed 20 familiar loci on the journey to the laboratory but they only produced an image for the words to be recalled, therefore the loci were not used. Participants were asked to rate the images on the vividness scale. Results indicated that the familiar cued group were the most successful, however, the unfamiliar cued group performed almost as well as the familiar cued group. Thus, meaning that a series of loci are effective retrieval cues but a familiar set will enable better performance.

Hunter (1977) points out that it is important for the learner to understand the material fully before applying mnemonic techniques. However, the participants in Bellezza's experiment were not aware that they were in a learning situation and in the familiar condition performed the mnemonic very successfully. Paivio (1971) argues that "in natural memory for events, visual imagery is usually not needed because visual perception is taking place and automatically integrating the contiguously occurring events. Even in experimental situations, learning is generally better if objects or pictures of objects are used as the items rather than their names" (1971, p.279; cited in Belezza & Reddy, 1978). To summarise, it would seem that mnemonics can be powerful methods of learning new material, however, caution should be taken, particularly due to the problem of interference.

Neisser (1978) forcibly argued against the sterility of memory research, stating that, "if X is an important or interesting feature of human behaviour, then X has rarely been studied" (Neisser, 1978, p.2, cited in Neisser, 1987). As he points out, the study of memory should not just be theory driven, obsessed with proving and disproving mental models and processes. There is now room for the study of phenomena, which are interesting in their own right. In recent years, the outcome of memory research is not simply focused on application and an understanding of natural phenomena using scientific techniques is

now encouraged. Although he believes that Psychology is heading in the 'right' direction, Neisser argues that memory is not in a social vacuum yet few researchers treat it accordingly (Neisser, 1987). However, since Neisser made his bold claim, a naturalistic approach to memory has prospered and the discipline has become much more ecologically valid. However, the everyday memory is in its infancy and needs development, although some psychologists such as Banaji and Crowder (1989) object to what they call the "bankruptcy of everyday memory" (cited in Baddeley, 1997). They argue that everyday memory experiments are plagued with difficulties relating to lack of control and strict manipulation of variables thus resulting in a loss of time and money. Both of which are very real factors, which influence research. Baddeley (1997) argues that both are essential. Without the strict control and rigour of the laboratory it would be difficult to test and develop theories, yet without the rich and varied context of naturalistic settings, it would be impossible to generalise to real life and produce ecologically valid research and theories.

The dominant paradigm in Cognitive Psychology is the information processing approach, which, as mentioned above, has been strongly influenced by the development of the electronic computer. Although its terminology may provide a useful metaphor for describing the functions of the mind, there is a general consensus that humans do not take in information like such machines. Baddeley (1997) argues that it is nonsensical to suggest that human learning follows the same channels as a computer and evidence indicates (e.g. Bartlett, 1932; cited in Baddeley, 1997) that information is actively interpreted according to our existing knowledge. In line with this, the assumption could be made that problems would arise when an individual is trying to learn a subject which they know nothing about. As they have no pre-existing knowledge with which to interpret the new information. This means that complex strategies need to be employed to set up basic knowledge foundations from which understanding of novel concepts can be built.

Schemata can be defined as organised packets of semantic knowledge, which tend to be clustered. They involve knowledge, which is generic, and may represent objects, events

or sequences of events and situations. Kant was among the first to put forward schemata, defining them as innate structures, which aid our perception of the world. Piaget (1896-1980) was also amongst the most prominent researchers to use schema theory, in his explanation of children's cognitive development. He used the term assimilation to refer to information being incorporated into a schema without the new information causing radical alteration. Accommodation, however, would involve either a new schema being created or a significant change in terms of its organisation and meaning, as new information may not fit easily with pre-existing knowledge of the world. Bartlett (1932; cited in Baddeley) observed the way an individual's expectations shape the way events are perceived and understood. He conducted a study whereby he presented English participants a Native American folk story. The 'War of the Ghosts' story does not follow the typical 'rules' of a western story, which suggests that the participants would hold expectations about the story, which would be contradicted. Bartlett found, that when asked to recall what they could remember, participants would reconstruct the tale according to a westernised world-view. Although Bartlett's ideas have been criticised for being too simplistic there has been renewed interest in schema theory. Modern schema theories follow the ideas of Bartlett suggesting that they operate in a top down manner and they may be 'nested' in each other in the same way that concepts are interlinked (Baddeley, 1997).

To conclude the contributions from Cognitive Psychology, Eysenck (1984) argues that memory and learning will be affected by the following four factors: the nature of the task; the type of material to be learned; the individual characteristics of the students and the nature of the retention task. Consequently, any research seeking to examine student learning should take into account each of these factors.

Contributions to the field of student learning from Education

The other field, which has contributed significantly to the study of student learning, is the field of Education. However, Education has not developed in the same theory driven

manner as Cognitive Psychology. There are a number of researchers who have been particularly influential in shaping the discipline and some of these will be discussed. William Perry (1970) conducted a longitudinal study, which followed the intellectual development of male students at two American universities. In each year of the degree course, unstructured interviews were conducted. The interview transcripts pointed to a series of developmental stages: consisting of 9 positions, which were categorized into three divisions. In the first division 'the period of dualism', the student views the world with a polar sense of right and wrong, where right answers exist in the absolute. The student will believe authority in an unquestioning manner, but as they begin to develop, diversity of opinion will lead to uncertainty. In the 'period of relativism', the student moves from this uncertainty to understanding relativism and dualism in context. The final 'period of commitment in relativism' begins with the student initially committing to an idea and leads to a realisation that knowledge and beliefs are an ongoing ever-changing process. The student will begin to establish a personal philosophy and will begin to understand the conflicting attitudes of others (cited in Richardson, 1987). Rather than focusing on how an individual develops in their learning, Pask and Scott (1972) adopted an experimental approach to examine differences between types of learners. In their study, 16 participants were asked to read a body of information regarding two types of hypothetical 'Martian fauna': 'Clobbits' and 'Gandlemullers'. Pask and Scott required participants to teach the information that they had just learnt back to them, and also to respond to 30 questions. They identified two different types of learning strategies: 'Holists' attempted to understand the information more globally including its implications, whereas 'Serialists' were more concerned with specific details. "Serialists learn, remember and recapitulate a body of information in terms of string-like cognitive structures where items are related by simple data links...Holists, on the other hand, learn, remember and recapitulate as a whole" (Pask and Scott, 1972; cited in Richardson, 1987).

Marton and Saljo (1976) were among the first to apply Craik and Lockhart's (1972) Levels of Processing theory to student learning approaches. As mentioned above, Craik and Lockhart demonstrated that the deeper the level at which information is processed, the better the recall. Throughout the literature there appears to be agreement on two

approaches to studying: deep and surface approaches. A surface approach involves minimal engagement with the learning material and focuses on memorizing information in its present state. However, a deep approach involves a more complex understanding of meaning and focuses on the structure of the problem as a whole, relations between parts of the subject matter and the author's message in association with the evidence used to support it (Ramsden, Martin and Bowden 1989). Deep insight or knowledge refers to the rules and principles underlying observable facts (Sandberg and Barnard, 1997). In order to identify 'deep' and 'surface' approaches to learning, several instruments have been devised. These are self-report questionnaires and the most extensively used include: the Approaches to Studying Inventory or ASI (Ramsden and Entwistle, 1981) and the Study Process Questionnaire or SPQ (Biggs, 1987). These questionnaires have been administered extensively, particularly in the UK, Australia, Sweden and the USA but not extensively out of these countries and particularly not out of the West. These instruments also identify a 'strategic' approach to learning, which focuses on the use of organised study methods and is concerned with achieving the best possible degree performance, as opposed to a greater understanding of meaning.

Student motivation is unavoidably intertwined with student learning and is therefore included and measured in the ASI and SPQ. Pintrich and Schrauben (1992) stated that "pupils who have positive motivational beliefs, that is those who believe that they can accomplish certain tasks, believe that learning is under their control, approach tasks with an orientation to learning and mastery, and are interested in and value the task content, will be more likely to become engaged in learning in a deeper, more self-regulating fashion than those students who do not have these beliefs" (p.1). The type of learning described by Pintrich and Schrauben not only describes a deep approach but also intrinsic motivation. Researchers have sought to distinguish between two fundamentally different types of motivation: intrinsic and extrinsic. The former is internal in origin and is derived from feelings of satisfaction and reward and interest in the subject. The latter is derived from an external source, for example a degree course may be undertaken due to future employment prospects, parental influence or avoidance of employment (Reber, 1995). Extrinsic motivation is concerned with seeking reward or avoidance of punishment

(Lepper, 1988). Graham and Weiner (1996) point out that indicators of motivation include persistence, and intensity. It is well known that when a student is oblivious of all else and occupied by an involving, interesting and engrossing task, then motivation is high. Deci (1975, cited in Graham and Weiner, 1996) stresses the importance of intrinsic motivation, where interest is increased and mastery and learning are sought for their own sake.

Fransson (1977) examined intrinsic and extrinsic motivation. A total of 81 students were required to read a passage of text under conditions, which were manipulated to create intrinsic or extrinsic motivation. They found that students who were not interested in the subject matter and extrinsically motivated were more likely to adopt a surface level of processing and reproducing orientation. However, if the student was intrinsically motivated then the student produced accurate factual recall and a strong interest and adaptive approach. Nolen (1988, cited in Lepper, 1988) argues that 'task oriented' students will use strategies which process information at a much deeper level than 'ego oriented' students who are more concerned with comparing favourably against classmates. Condry and Chambers (1978; cited in Lepper, 1988) found that if students were offered a tangible reward for successful completion of a task, they showed less logical thought and performed less efficiently than students offered no reward. Further investigation revealed that if the participant was then asked to complete a task with no reward they continued to employ these ineffective strategies. These studies highlight the importance of intrinsic motivation in the academic setting, although Lepper (1988) emphasises that not all forms of extrinsic incentives have unfavourable effect on intrinsic motivation. Thus, it is important for educational psychologists to ascertain how to maximise intrinsic motivation to aid students in performing at an optimal level. De Charms (1968, cited in Lepper, 1988) promotes the idea of the student actively controlling their own environment, rather than seeing themselves as 'pawns'. Lepper (1988) suggests that if a student is already motivated by the subject matter they should minimise the extrinsic constraints on the activity, but if the student is not intrinsically motivated, use should be made of powerful extrinsic incentives, but these should be gradually withdrawn over time as the self confidence and ability of the student increases.

Snyder (2000) proposed a motivational theory. This cognitive theory of Hope comprised of three components: goals, agency and pathways. The goal is a cognitive representation of an individual's desired target. Pathways thought is the ability to perceive routes to these goals whereby individuals with higher hope think of a greater number of plausible ways of overcoming obstacles. Agency is the mental willpower or motivational component, which propels individuals along their imagined routes to goals. Snyder (2000) devised a diagnostic instrument in order to determine agency and abilities to identify routes to goal attainment. Using this Hope Scale, a Hope score may be calculated by adding together pathways and agency scores. Snyder devised a number of scales including an Adult Dispositional Hope Scale, Adult State Hope Scale and an Adult Domain Specific Hope Scale. The former measures an individual's hope across their life span, whereas the second measures current hope. The latter examines six life domains, which are Social, Romantic, Family, Academic, Work and Leisure. In the questionnaire, statements are posed and the respondent is required to indicate on an eight-point Likert Scale, how each statement applies to them (Snyder, 2000).

A series of tests were conducted to ensure the reliability and validity of Snyder's Hope Scale. Babyak, Snyder and Yoshinobu (1993; cited in Snyder 2000) investigated the components of the Hope Scale: Agency and Pathways. They conducted factor analysis on Hope Scale scores of participants over a four-year period. Findings revealed that Agency and Pathways could be described as separate but highly related entities. The researchers argued that the Hope scale could be theoretically supported as the results indicated that the components were found to be distinct. Snyder, Irving, and Anderson (1991, cited in Snyder 2000) tested the Hope scale on undergraduates finding that 30% of participants had both high Agency and Pathways scores and 5% of the sample received low scores on both components. This suggests that there is internal consistency as a high number of people achieved a similar score for each component.

In addition to such tests, the Hope Scale was correlated to similar instruments for measuring positive motivational beliefs (Snyder, Cheavens and Michael, 1999; cited in

Snyder 2000). Snyder, Irving, and Anderson (1991; cited in Snyder, 2000) found that participants scoring high on self-esteem also scored highly on the Hope Scale. They also found Hope to be positively correlated with optimism, perceptions of control in life and the perceived ability to problem solve. Hope was also found to correlate negatively with social introversion, anxiety and depression (Snyder, 1995; cited in Snyder, 2000). Snyder, Irving, and Anderson (1991, cited in Snyder 2000) also examined reliability by testing undergraduates. These students were split into four groups and at intervals of 3 to 5 weeks, collected scores on the Hope Scale. Results indicated that scores on the Hope Scale are temporally stable. In summary, such findings indicate that the Hope Scale is a reliable and valid instrument.

Vallerand, Pelletier, Blais, Brière, Senécal and Vallières (1992) developed a similar scale to measure academic motivation. The scale measures three types of intrinsic motivation, which may be apparent in three forms. The first is intrinsic motivation "to know" whereby the student is driven to learn by satisfaction and pleasure that is gained from learning. The second, "intrinsic motivation towards accomplishments" may also be found in Developmental Psychology as 'mastery motives'. The student may focus on the process of achieving and gain pleasure and satisfaction from accomplishing something. The third is "intrinsic motivation towards stimulation" which includes sensory pleasure, fun and excitement and aesthetic experiences, which may be found in the learning environment. Thus suggesting a student is motivated to learn because they get a 'kick' out of it.

The existence and development of these instruments has offered researchers an opportunity to measure differences between learners, such as gender, age, types of subject studied and also development through the degree course using a cross-sectional design, examining year of study. Meyer (1995) argues that gender issues have not been a prominent feature in quantitative studies of student learning and that the area is neglected. Biggs (1987) investigated gender differences as part of his analysis of the findings from his Study Process Questionnaire. Using Deep, Surface and Achieving definitions, he measured the study strategies and motives, which combine to provide an approach to

learning. Biggs found that males tend to score higher on the surface approach, which includes strategies such as repetition and highlighting and extrinsic motives. Females tended to score higher on the achieving approach, in particular the achieving strategy, which includes techniques such as planning study beforehand and using past exam papers. Zeegers (2001), however, used the same instrument and found there to be no gender differences in approach to learning. Jacobs and Newstead (2000) used a different instrument to find that females are more motivated than males. The findings of Biggs (1987) supported Severiens and Dam (1994; in Meyer, 1995), who carried out a meta-analysis of research into gender in student learning and concluded from their findings that there is little systematic evidence of gender differences. If gender differences in study strategies and motivation do, in fact exist, then one would expect to find gender differences in student performance. Rudd (1984, in Hoskins and Newstead, 1997) examined the degree results of all British universities over a twelve-year period. He found that there were no significant differences between the mean degree marks, but he did find that there was a greater amount of variation in the males' scores. The male students were found to receive more first class degrees but also more third class degrees, than females. This finding has also been supported by more recent data sources (Department of Education and Employment, THES, 1995; in Hoskins and Newstead, 1997). Hoskins and Newstead (1997) also found, that gender was a poor predictor of performance, when analysing final degree classifications of a British university. They concluded that prior research examining final degree classifications, has found little evidence of any overall differences in means, however gender differences have been found in the distribution of grades. Meyer (1995) states that research is still unclear as to whether any such differences exist and, if this is the case, what the theoretical and practical consequences of such differences may be. The current study will examine whether gender differences exist in terms of frequency of use of study skills and motivation and commitment to study.

A number of studies have also investigated how motivation and study skill use differ across the degree course. Biggs (1987) argues that considering the number of studies investigating approaches to learning, there is surprisingly little known about how

approaches to learning change over the degree course. He points out that researchers know little about how study strategies and motivation change and develop as the student progresses through their course. However, there is a body of research to suggest that approaches to learning are dynamic and amenable to change (Busato et al., 1998; Watkins and Hattie, 1985; Vermetten et al. 1999, Volet et al, 1994; cited in Zeegers, 2001). This may vary according to the learning situation that the student is faced with. Jacobs and Newstead (2000) agreed with Biggs that little is known about how motivation changes through the degree course. Consequently, they conducted a study, which found that motivation reduces significantly in the second year but rises in third year. This recovery of motivation is called 'exit velocity' and would suggest that students perform better in their final year. Zeegers (2001) conducted a longitudinal study into approaches to learning across the degree course, using the SPQ. He found approaches to learning to be changeable according to what is required of the student and also that the achieving approach declines through a degree course, particularly in terms of the achieving strategy. Harper, Kember and Richardson (1995; cited in Zeegers, 2001) argued that older students are more committed to their study and use more elaborate study approaches. Watkins and Hattie (1985) conducted a longitudinal study using the ASI, to investigate approaches to learning and found that Deep scores declined from first to third year. They found that regardless of sex, age or subject that there was a decrease in the use of the Deep approach from first to third year (cited in Zeegers, 2001). Zeegers (2001) also argues that students see university study, particularly in year one, as a survival course, and that they employ strategies that are suited to the task in hand. He suggested that older students use different study methods than their younger colleagues and are consequently more successful in terms of grades. The research is varied but seems to suggest that study skills will change as the degree progresses. Research also seems to indicate a drop in motivation after year one and then a rise in third year.

There has also been a considerable amount of research examining whether traditional students differ from those who have taken a break in their education (i.e. year out or mature students). Richardson (1994) found that taking a break from study, even for only one or two years, has an impact on approach to learning and that such students use a

deeper approach. Hoskins and Newstead (1997), however, found no significant differences in terms of student status with regard to the frequency of use of study skill types. This suggests that mature students are not going about their study any differently than traditional students. This finding supports Richardson (1994) who forcibly criticises the stereotype that mature students have a deficiency in basic skills, which are essential for student learning. Richardson critically evaluated a body of research evidence concerning the academic performance of mature students. He cites Marshall and Nicolson (1991), who studied 80 Psychology students at a London polytechnic and Hartley and Lapping (1992) who studied 51 mature students at Keele University and matched the mature students with traditional students of the same gender and main subject. Richardson (1995) also conducted a similar study investigating 76 graduates out of 98 students studying Psychology, Sociology or Social Anthropology at Brunel University. All three studies concluded that there were no significant differences between traditional and mature students and that results indicated that mature students performed slightly better than their younger colleagues. Although this finding was not statistically significant, he concluded that there is no evidence to suggest that mature students fare any worse than traditional age students in terms of degree classifications (Richardson, 1994).

Richardson (1994) also argues that older students have greater maturity and show greater motivation. Nolen (1988; cited in Lepper, 1988) suggested that intrinsically motivated students will utilise more effortful but deeper study skills and Harper, Kember and Richardson (1995; cited in Zeegers, 2001) argued that older students use more elaborate study approaches and are in general more committed to their study. Biggs (1987) found that the Surface approach decreases significantly after the age of 18 until the mid-twenties where it stabilises, until after the age of 39 when there is a considerable decline. He pointed out that "in terms of motivation, what seems to be happening is that the material and psychological costs of entering a tertiary institution tend to increase with age: older students would thus have more to give up, and would need to be increasingly intrinsically or achievement motivated than younger students. Correspondingly younger students are more pragmatically or instrumentally motivated: they are more likely to have

the 'meal-ticket' mentality" (p.57). Biggs suggests that Deep strategies are more readily acquired in real life than in the classroom. He suggested that the longer a student is away from the classroom, the more likely they are to adopt deep study techniques and reject reproducing approaches. He also points out that it is ironic that mature students feel 'out of touch' with study techniques as their methods are better than students who have continued in education straight from secondary school. If mature students do not differ in terms of their study skills, but are more motivated and committed, particularly in terms of the number of hours spent studying, it would be expected that they would perform better than traditional students in terms of degree success. This was supported by Bourner and Hamed (1987; cited in Hoskins and Newstead, 1997) who found that mature students, obtained considerably more firsts and upper second class degrees than traditional students. The research suggests that mature students go about their study in the same way as traditional students, but also that they are more motivated than traditional students.

With regard to differences between learning methods for differing subjects of study, past research has revealed some conflicting findings. Watkins and Hattie (1985) conducted a longitudinal study, finding that regardless of subject there was a decline in the use of the deep approach as the student progressed through the degree course (cited in Zeegers, 2001). However, many studies have documented a difference between Arts and Science students finding that Science students score higher on the surface approach, whereas Arts students use the deep approach more frequently. As can be seen by the research above there has been a great deal of research into differences between types of learners but only limited research into the techniques. There has been little research into documenting the types of techniques that students use and also the efficacy of approaches.

Morris (1979; cited in Eysenck, 2004) described a study skill, which represents the five stages of effective reading, called the SQ3R approach (Survey, Question, Read, Recite, Review). The first stage requires the reader to get a general idea of what the chapter/article is about by reading chapter summaries or scanning subheadings and getting an idea of the topics involved. The reader should then write a number of

questions, which the survey stage suggests will be answered in the text. The read stage involves both trying to answer the questions and integrating the information into pre-existing knowledge. The recite stage involves trying to remember the key ideas in the text and the review stage involves combining the key ideas into a coherent structure. Morris argues that this is a successful technique because it involves an active engagement with the information to be learnt rather than passive. Eysenck (1998; cited in Eysenck, 2004) argues that when students read chapters in books in a passive manner, they may recognise the information, however, when in a stressful exam they may not easily be able to recall the information. The advantage of the SQ3R technique is that the Recite and Review stages are designed to help students do this

Mind Mapping is a study technique developed by Buzan (2000), which diagrammatically represents factual material in the form of keywords. Information originally contained in passages of text is hierarchically organised, with the most general information being presented in the centre of the mind map and the material of increasing detail being presented at the extremes. During production a key word or image is drawn in the centre of a page. Extending from this central image are branches containing keywords representing topic subheadings, with more detailed information upon smaller branches projecting from the subheadings (Please see Appendix 1 for an example). When reading a Mind Map, the central image forms the starting point with the branch to the top right hand of the central image being the first branch inspected. When the branch has been inspected, the other branches are covered in a similar manner working in a clockwise fashion (Buzan, 2000). Mind mapping is a complex skill, which involves a number of stages. The technique can be used in a range of settings, for note taking and note making. Note taking involves taking notes from a lecture or written source, i.e. putting it into your own words, however, note-making involves incorporating a range of sources into an understanding, i.e. turning the notes you have made into an understanding involving how concepts relate to each other and mind maps can also be used for revision, whether it be calculated and planned or last minute. Buzan (2000) argues that Mind Maps have many advantages to standard linear notes. He argues that standard linear notes tend to take one of three forms: narrative style, list style and numerical/alphabetical notes forming

hierarchies of major and subcategories. All of these notes are linear in presentation. Buzan highlights the importance of key words, which are often obscured and spread between many pages in standard linear notes. He states that linear notes are visually boring and are a waste of time as the important information to be learnt is surrounded by filler information, which is time consuming to both, write out and read. Buzan argues that Mind Mapping solves such problems. He cites the research of Sperry (1968) who demonstrated the dominance of the left hemisphere for tasks involving logic, reasoning, language and numeracy and the dominance of the right hemisphere for imagery and spatial awareness. Buzan argues that Mind Mapping "uses both sides of the brain" and is therefore a superior method of learning.

Farrand, Hussain & Hennessay (2002) investigated the efficacy of the Mind Map study technique by randomly assigning medical students into two independent groups: a Mind Map group and a group using self selected study techniques. Initially to produce a baseline score, students were given a text taken from Scientific American and were asked to learn the material using the techniques they normally use. From this text three sets of 15 questions were formulated, one for each stage in the experiment, these were fully counterbalanced. A distraction task was then used to prevent rehearsal and then the students were given the first set of questions to answer. The next part of the experiment did not require participants in the self-selected condition, so they were asked to return in 30 minutes. In this time the mind map group were given a lesson on the Mind Map technique. After this period, all of the participants were then given a text and were asked to split the allocated time between reading the text and using the study technique that their condition required of them (i.e. Mind Map or Self-selected). A distraction task was used once again, and lists of questions were circulated for completion. Also students were asked to rate themselves on their level of motivation to study the material. The mind maps were then graded on a Likert scale according to quality and the participants were asked to return a week later. Participants were then given the final set of questions without seeing the text again. Results indicated that there were no significant differences between conditions (Mind Map and Self Selected study technique) in the number of items recalled. Although within the mind map condition, there was variation in the ratings of

mind map quality, so this was analysed. The participants who produced high quality mind maps answered significantly more questions correctly when compared with 'average quality' mind mappers and those in the self-selected group. Farrand et al also found that there was a significant difference between the two groups, in terms of motivation: the mind mappers were less motivated. However, when this was analysed, the low motivation was attributable to the 'poor quality' mind mappers and not the 'good quality' students. Thus, Farrand, Hussain & Hennessay (2002) concluded that Mind Mapping is a preferable method of learning written material provided that the mind maps themselves were of high quality and that the student is highly motivated.

Williams, Williams and Appleton (1997) advocated Mind Mapping for use in Cognitive Behavioural Therapy, particularly for use in case formulation. They suggest that the technique can clarify thinking, encourage focus on relevant information and can, therefore, help to identify key problems. They highlight the hindrance of losing focus, which can lead to the neglect of key elements and also the time consuming nature of linear notes. Williams et al believe that what is needed is a method of capturing the key pieces of information and presenting them in a uncluttered, concise, quick manner, which they suggest the Mind Mapping technique can achieve. Williams et al promote mind mapping as a method of organising, structuring and integrating information with a focus on clarity. They point out the ease with which mind maps may be updated and due to the lack of 'filler' information found in linear text, they can be reviewed quickly and efficiently. The maps are so flexible that they can be adapted for use with different theoretical approaches and are also multi-disciplinary. They suggest that mind maps allow a more holistic view of a subject or problem. Williams et al also argued that mind maps can "anchor information and trigger associations" (p.262). They also point out that mind mapping involves different modes of memory storage; for example, information may be factual or visual, involving symbols, colour and spatial arrangement. Thus, they suggest that using a variety of modalities is favourable to using a single modality, which is the case with standard linear notes. As mind maps have a central focal point, which should be an image, retrieving this from visual memory should prompt the recall of the

rest of the map. They also point out that being so quick to review and read can maximise use of the recency effect.

Concept mapping is a similar technique to mind mapping, involving many of the same fundamental rules. It was advocated by Novak (1984), who argued that "meaningful learning involves the assimilation of new concepts and propositions into existing cognitive structures" It is a technique which presents information in a graphical form, whereby concepts take the form of nodes in a network connected by links. The network is hierarchically organised. Concept maps are methods of hierarchically organizing information, where the most general information tends to be found at the top of the map. Concepts are enclosed in nodes, which are interconnected by links to form networks. West, Pomeroy, Park, Gerstenberger and Sandoval (2000) advocated the concept mapping technique in Medical Education. They examined the effect of concept map training on 21 resident physicians in paediatrics. The medics were firstly asked to construct a concept map outlining their knowledge on the subject of seizures. Instruction on how to construct concept maps followed and in the post-test condition the participants were once again required to draw a concept map. The maps were then assessed and rated independently. Findings showed that instruction resulted in better quality concept maps, however, when these scores were correlated with scores from the American Board of Paediatrics In-training Examination score, there was no significant effect. Hughes and Hay (2001) investigated the use of concept maps when producing e-learning materials. The design team and wider stakeholder were invited to contribute to the development of online learning materials by producing concept maps. The maps were analysed to identify unique contributions and commonalities and were finally integrated into an overall map of the entire project. Hughes and Hay reported this process to be valuable for creating a more critical and holistic approach to directing a project. Riley and Ahlberg (2004) investigated the effect that an information technology concept mapping intervention had on primary school children. Although previous studies have been inconclusive, the results showed an increased ability in the children's reasoning skills. Riley and Ahlberg suggest that computer aided concept mapping can produce a reliable

framework upon which written work can be based and it also provides an opportunity for developing innovative practice in teaching.

Hatpaz, Balik and Eherenfeld (2004) investigated the relevance and effectiveness of concept mapping in the instruction of nursing. They argue that concept mapping can advance the process of learning and develop core skills, such as organisation of information, critical thinking, understanding complex relationships and the integration of theoretical knowledge and nursing practice. Staff members at an Israeli teaching hospital were taught to use concept mapping and after intensive preparation, the teachers began to develop concept maps with the students. At the end of semester teachers and students were asked to rate the concept mapping technique as compared with traditional teaching methods. Teachers reported that concept maps increased active learning and improved organisation and students reported an increase in independent thinking, confidence and increased orientation in knowledge when examining the links between areas. Hsu (2004) investigated the effects of using concept mapping in Problem Based Learning. Participants were randomly assigned to either a control group, which received traditional teaching or an experimental group, which was taught about concept mapping in a problem based learning setting. Both groups received instruction on concept mapping but the experimental group was found to produce the more developed concept maps. Hsu concluded that substantial support and effort is required when learning how to concept map, however, the technique is a beneficial method of learning new concepts.

Despite these recent findings, there appears to be a void in the research, which this study aims to contribute to filling, in that surprisingly little research may be found concerned with the efficacy of study techniques. Institutions are investing in such literature and often holding study skills workshops advocating techniques, which have little scientific support. This study aims to take the advantages of both educational and cognitive psychological research. Following Parlett's (1972) suggestion the research will begin by studying the academic context. The first study in this research will examine exactly which study skills and strategies are being employed by students, and how often these

strategies are being used. Once this is understood, the research will continue to examine the effectiveness of particular techniques.

There are three main aims of the proposed research: to investigate which study skills are actually used by students and the frequency of this use; to examine the relationship between academic motivation and study skill use; and finally to investigate the efficacy of the mind map technique. The current investigation will be split into two parts. The first will take the form of a questionnaire designed to examine exactly which methods students use to go about their study and how often these methods are employed. The questionnaire will also measure the students' motivation using an adaptation of Snyder's (2000) Hope Scale. The second part of the study will examine the efficacy of a particular study skill called the mind map technique.

Chapter 2 – Study Skill Use

2.1: Study 1 – A preliminary investigation

After reviewing the research, it would seem that there are gaps in the literature in terms of exactly which study skills are used by students and to what frequency. Although there has been a wealth of research into 'types' of study skills, the individual study skills themselves do not appear to have received much attention. Such 'types' were investigated by researchers, such as Marton and Saljo (1976), Entwistle (1975), Ramsden (1981) and Biggs (1987), who used questionnaire tools to identify distinctive approaches to learning. There was a broad consensus across the literature on three main 'types' or approaches to learning: Deep, Surface and Strategic. The Strategic approach is also referred to as the Achieving approach. However, there has been some dispute over the consistency of use of these approaches. The present study seeks to examine the study skills that make up these approaches in order to investigate their frequency of use alongside motivation and commitment to study. This preliminary study will be exploratory in nature. In order to improve methods of study, it is first necessary to understand exactly what students do when they study. So, the main focus of the study is to identify how frequently individual study skills are used in the learning situation. As mentioned in the literature, motivation is a major factor in student learning so information will be collected on this also. The literature also shows a number of factors, which are influential in terms of student learning, particularly gender, age and progression through the degree course. Such factors are discussed in the previous chapter, (in particular please see: Meyer 1995; Hoskins & Newstead, 1997; Biggs, 1987; Zeegers, 2001; Jacobs & Newstead, 2000; Richardson, 1995; Watkins & Hattie, 1985, cited in Zeegers, 2001). There does not seem to be any British research examining the existence of differences in the frequency of use of study skills and motivation according to degree classification (i.e. Single Honours, Joint Honours or Major / Minor). However, it was thought that it would be interesting to investigate this area.

The main aim of the study is to investigate how frequently individual study skills are used. The study will also investigate the existence of any gender differences and how students change over the degree course, particularly in terms of motivation. The status of students (i.e. whether the student has had a break in their study) will be examined and also whether any differences exist between the three paths of study. In addition to the Hope scale, intrinsic and extrinsic motivation will be examined as will commitment to study. Although, from the literature a number of tentative predictions could be made, there will be just two formal hypotheses, which follow:

H1 Students will decrease motivation after year one and this will then recover in year three.

H2 Mature students will score higher on motivational scales than traditional students.

2.2: Method

Design

A questionnaire was devised to determine which techniques students are using when they study. This questionnaire consisted of three parts: the first section was to determine demographic information. The second section examined the frequency of use of particular study skills, for each subject studied and for both exam and coursework. The final section was to measure academic motivation and commitment to study. The independent variables in the study were gender, year of study, student status (i.e. whether or not the student has had a break in their study) and path of study (i.e. Single Honours, Joint Honours or Major/Minor). The dependent variables were scores on study skill frequency and motivation.

Participants

There were 104 participants in the study, all of whom were undergraduates at Chester College in North West England. The age range was 18 to 46 and the mean age was 21. There were 37 males and 67 females. There were 23 first year students, 51 second year students, 29 third year students and 1 student who did not respond to this item. There were 71 traditional students and 33 students who had had a break in their education, for example, a year out was taken or the student is a mature student. With regard to degree classification, there were 54 single honours students, 25 joint honours students, 24 major / minor students and 1 student who did not respond to this item. A list of the participants' subject(s) of study may be found in Appendix 2. All of the participants were recruited by opportunity sampling. To ensure that participants were treated according to BPS guidelines, they were assured that confidentiality and anonymity would be maintained and that they were free to withdraw from the study at any time.

Materials

The questionnaire was designed by the researchers, although the final section was adapted from Snyder's Hope Scale (2000). A copy of the questionnaire may be found in Appendix 3. The questionnaire consisted of three main sections: the first requiring demographic information. This included sex, age, year of study, the student's status in terms of whether the student had had a break in their study (for example, if they are a mature student or if they have taken a year out), the subjects that they are studying and also information regarding their degree programme (single honours, joint honours or major / minor).

The following section required ratings of frequency of use of eight study skills, which are listed below, in Table 2.1.

Table 2.1: Study Skill Questions

Question Number	Study Skill Question
1	Do you plan study beforehand (e.g. timetable)?
2	Do you look over lecture notes and do essential reading?
3	Do you highlight key words and relevant information?
4	Do you use repetition of notes and mental rehearsal?
5	Do you skim read notes and chapters (e.g. looking at highlighted points and headings, etc)?
6	Do you read intensively paying attention to details?
7	Do you look at past exam papers? (exam only)
8	Do you use charts and diagrams as study aids?

Information was collected on frequency of use of each of the study skills, for each subject studied and for exam and coursework. Thus, meaning that there were a total of 30 questions, as study skill 7 was only applicable to exams. Frequency of use was measured on a scale ranging from 1 to 7 (1 being never, 7 being always) and only the extremes were labelled. In order to treat the data on an interval scale, this information was recoded

in SPSS to 0-6, with 0 indicating that the study skill is never used, and 1-6 indicating that the skill is used, and allows a measure of frequency (6 being always). There was also a qualitative item whereby participants were asked about their main method of study.

The final page of the questionnaire was concerned with academic motivation. Snyder's (2000) Hope Scale was adapted for use in British Higher Education by the researcher. This was adapted by changing words such as "school work" to "degree". This was done to ensure that participants understood that it was Higher Education that was being referred to, rather than primary or secondary school. However, such an adapted Hope Scale cannot be assumed to be reliable or valid without testing. So although the meaning of the statements was not altered considerably, it cannot be assumed that the scale measures Hope as stated by Snyder (2000). Therefore, when Hope, Agency and Pathways are referred to in the remainder of this thesis, one must bear in mind that the altered scale has not been through the rigorous testing conducted by Snyder and the terms should be interpreted with this in mind. However, the Study Skill Questionnaire was constructed by the researchers and did not go through any testing. The adapted Hope Scale will, therefore, be included as a means of measuring academic motivation.

Therefore, academic motivation was measured by presenting participants with a series of statements and they were required to indicate how applicable each statement was to them. Scores were measured on a scale of 1-7, with 1 being "definitely false" and 7 being "definitely true". Only the extremes were labelled. The Agency score is concerned with statements 1, 3, 5 and 8, and the Pathways scores is concerned with statements 4,6 and 9 from Table 2.2 below. Agency and Pathways scores are combined in order to calculate a Hope Score. The additional components on this page of the questionnaire were devised by the experimenter and include: an item (2) to measure Extrinsic Motivation and an item (7) to measure Intrinsic Motivation. There were also statements to measure the student's commitment, in terms of how frequently they miss lectures (10), how rarely they apply for extensions (11).

Table 2.2: Motivation Statements

Statement Number	Type of Statement	Motivation Statements
1	Agency	I am keen to get a good mark in my final degree.
2	Extrinsic Motivation	I am motivated by other people's expectations rather than my own.
3	Agency	I am determined to work hard in my study to achieve my desired outcomes / career aspirations.
4	Pathways	Even if the course is difficult, I find a way to succeed.
5	Agency	For each module I put in as much effort as possible.
6	Pathways	I think of lots of ways to make good grades.
7	Intrinsic Motivation	I need to achieve goals for myself more than anyone else.
8	Agency	I nearly always get the grades I want in my academic work.
9	Pathways	There are lots of ways to meet the challenges of my modules.
10	Other	I very rarely miss lectures
11	Other	I very rarely apply for extensions.

Procedure

The study skills section of a university library was examined to determine which techniques were prescribed by the texts. The most common techniques were identified and were integrated into a questionnaire, which was designed using Formic 3. The questionnaire directed participants to read each item and to select a response by putting an X in the appropriate box. This was to be done for both subjects of study and also for both exam and coursework. Participants were then thanked for their contribution. The questionnaires were scanned using Formic 3 and analysed using Excel and SPSS v.11.

2.3: Results

For each set of analyses in this thesis, it was not possible to include the effect size in addition to significant differences. However, it is acknowledged that in future research undertaken by the experimenter, effect sizes should be included. When using the Analysis of Variance statistical technique, it is also acknowledged that it is good practice to include the Mean Square. Although the Mean Square was not included in the body of the text, ANOVA tables have been provided in the appendices of this document. In each results section of the thesis the probability values have been reported. In addition to this asterisks have been used to indicate significance. Throughout the text, where one asterisk is used, this shows significance at the 0.05 level and where two asterisks are used, this shows significance at the 0.01 level.

The entire sample was analysed to find the mean and standard deviation for the frequency of use of each study skill, when studying for exams and coursework (with the exception of the question regarding past exam papers, which referred to exam only) and the results can be found in Table 2.3. The means and standard deviations for the entire sample were also calculated for each of the motivation variables. Please note that frequencies of the seven response options, for each study skill, may be found in Appendix 4.

Table 2.3: The means and standard deviations for the frequency of use of each study skill, when studying for exams and coursework

Study Skill	Exam		Coursework	
	Mean	SD	Mean	SD
Do you plan study beforehand?	3.81	1.492	3.55	1.576
Do you do essential reading?	3.99	1.491	3.83	1.700
Do you highlight key information?	3.86	1.819	3.81	1.800
Do you use repetition?	4.19	1.791	2.99	1.795
Do you skim read notes?	3.97	1.480	3.89	1.535
Do you read intensively?	3.29	1.651	3.27	1.735
Do you use past exam papers?	3.99	1.944	n/a	n/a
Do you use charts and diagrams?	2.94	2.063	2.48	2.058

Table 2.3 clearly shows that the study skill most frequently used when studying for examinations is "Repetition". When studying for coursework, however, "Repetition" is one of the least frequently used study skills. The study skill least frequently used when studying for both exams and coursework is "Charts and diagrams". The most frequently used study skill when studying for coursework is "Skim read". The study skill with the greatest variation in scores, for both exam and coursework is "Charts and diagrams", which is illustrated by the high standard deviations of 2.063 and 2.058, respectively. An analysis of the motivation variables was then conducted and the results can be found in Table 2.4.

Table 2.4: The means and standard deviations for the each of the motivation variables

Motivation Variable	Mean	SD
Agency	5.12	1.099
Pathways	4.65	1.168
Hope	4.88	1.062
Extrinsic Motivation	3.68	1.781
Intrinsic Motivation	5.45	1.325
Non-attendance at Lectures	5.10	1.754
Applications for Extensions	5.67	1.928

It can be seen from Table 2.4 that the mean "Hope" score (which is composed of an average of the "Agency" and "Pathways" score) is 4.88. Out of the two components, Table 2.4 clearly shows that participants score higher on "Agency" than "Pathways". The mean "Intrinsic Motivation" score is higher than the "Extrinsic Motivation" score. The greatest variation in scores is in the "Application for Extensions" variable, as shown by the standard deviation.

Analysis by gender

The study skill variables, for both exam and coursework, were examined to determine whether there were any gender differences in the sample. Table 2.5 details the mean frequency of use for each study skill.

Table 2.5: The means, standard deviations, t and p values for each study skill according to gender

Study Skill		Male	Female	t	p
Do you plan study beforehand? (exam)	mean SD	3.77 1.701	3.82 1.388	-0.157 (df = 96)	0.875
Do you plan study beforehand? (coursework)	mean SD	3.43 1.642	3.61 1.546	-0.558 (df = 101)	0.578
Do you do essential reading? (exam)	mean SD	3.55 1.608	4.23 1.384	-2.131 (df = 92)	0.036*
Do you do essential reading? (coursework)	mean SD	3.19 1.822	4.17 1.535	-2.881 (df = 100)	0.005**
Do you highlight key information? (exam)	mean SD	3.08 1.844	4.24 1.694	-3.024 (df = 92)	0.003**
Do you highlight key information? (coursework)	mean SD	3.18 1.853	4.16 1.682	-2.767 (df = 102)	0.007**
Do you use repetition? (exam)	mean SD	3.97 1.884	4.30 1.747	-0.838 (df = 91)	0.404
Do you use repetition? (coursework)	mean SD	2.65 1.798	3.17 1.779	-1.433 (df = 101)	0.155
Do you skim read notes? (exam)	mean SD	3.52 1.313	4.19 1.516	-2.111 (df = 93)	0.037*
Do you skim read notes? (coursework)	mean SD	3.42 1.470	4.16 1.518	-2.400 (df = 102)	0.018*
Do you read intensively? (exam)	mean SD	3.21 1.774	3.33 1.602	-0.326 (df = 93)	0.745
Do you read intensively? (coursework)	mean SD	2.85 1.929	3.51 1.585	-1.869 (df = 102)	0.065
Do you use past exam papers? (exam)	mean SD	3.90 2.087	4.03 1.886	-0.300 (df = 92)	0.765
Do you use charts and diagrams? (exam)	mean SD	3.21 2.261	2.80 1.962	0.905 (df = 91)	0.368
Do you use charts and diagrams? (coursework)	mean SD	2.99 2.262	2.20 1.893	1.892 (df = 101)	0.061

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

For each study skill, an independent t-test was applied to the data to determine the existence of any gender differences. There were significant differences between the sexes for the study skills "Essential reading", "Highlight key information" and "Skim read" but there were no significant gender differences for the other study skills. However, it should be noted that with the exception of the study skill "Charts and diagrams", females scored higher than males on how frequently they use the study skills. There was a significant difference in exam scores for the study skill "Essential reading", $t(92) = -2.131$, $p = 0.036$*. Table 2.5 clearly shows that the mean female score is higher than the mean males score. There was also a significant gender difference in the coursework scores for the same study skill, $t(100) = -2.881$, $p = 0.005$**. The means show the same pattern as the exam scores, in that the mean female score is higher than the mean male score. There were significant gender differences for the study skill "Highlight key information" for exam scores, $t(92) = -3.024$, $p = 0.003$**, and coursework scores, $t(102) = -2.767$, $p = 0.007$**. Table 2.5 shows that for both exam and coursework, the mean female score is higher than the mean male score. There were also significant gender differences for the study skill "Skim read" for both exam, $t(93) = -2.111$, $p = 0.037$*, and coursework, $t(102) = -2.400$, $p = 0.018$*. The means clearly indicate that females scored higher than males on frequency of use for both exam and coursework. An analysis of motivation variables according to gender variables was then conducted and the results can be found in Table 2.6.

Table 2.6: The means, standard deviations, t and p values for each motivation variable according to gender

Variable		Male	Female	t	p
Agency	mean	4.87	5.26	-1.727	0.087
	SD	1.284	0.963	(df = 101)	
Pathways	mean	4.59	4.68	-0.305	0.762
	SD	1.499	0.955	(df = 51)	
Hope	mean	4.72	4.97	-1.010	0.317
	SD	1.326	0.886	(df = 52)	
Extrinsic Motivation	mean	3.57	3.75	-0.488	0.626
	SD	1.908	1.717	(df = 102)	
Intrinsic Motivation	mean	5.03	5.68	-2.441	0.016*
	SD	1.576	1.112	(df = 100)	
Non-attendance at lectures	mean	4.41	5.48	-2.779	0.007**
	SD	2.101	1.407	(df = 54)	
Applications for extensions	mean	5.08	6.00	-2.211	0.031*
	SD	2.191	1.697	(df = 60)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

For each measure of motivation, an independent t-test was conducted to determine whether any gender differences existed. Table 2.6 clearly shows that that there were no gender differences for the variables "Agency", "Pathways", "Hope" and "Extrinsic Motivation". Although these variables were not found to be significant, it should be pointed out that females scored higher than males on all of the motivation variables. The variable "Intrinsic Motivation" was found to be significant, $t(100) = -2.441$, $p = 0.016*$ and the mean score for females was higher. There was a gender difference in non-attendance at lectures, $t(54) = -2.779$, $p = 0.007**$. The means showed that males miss lectures more frequently than females but the standard deviations show that there was greater variation in the males' scores than the females' scores. There was also a gender difference in how rarely students apply for extensions, $t(60) = -2.211$, $p = 0.031*$. The means showed that males applied for extensions more frequently than females. The standard deviations also showed that there was greater variation in the males' scores than the females' scores.

Analysis by Year

The same variables were then examined for differences between the three years of study. An analysis was conducted to examine whether there were any differences between years, for frequency of use of study skills. The results follow in Table 2.7, which clearly shows no significant differences in study skill use, between years.

Table 2.7 : The means, standard deviations, F and p values for each study skill according to year of study

Variable		Year 1	Year 2	Year 3	F	p
Do you plan study beforehand? (exam)	mean SD	3.50 1.405	3.91 1.548	3.88 1.498	0.591 (df = 2,94)	0.556
Do you plan study beforehand? (coursework)	mean SD	3.61 1.381	3.66 1.728	3.32 1.486	0.419 (df = 2,99)	0.659
Do you do essential reading? (exam)	mean SD	3.95 1.337	4.16 1.528	3.78 1.571	0.577 (df = 2,90)	0.564
Do you do essential reading? (coursework)	mean SD	3.93 1.474	3.92 1.773	3.64 1.763	0.275 (df = 2,98)	0.760
Do you highlight key information? (exam)	mean SD	3.65 2.059	3.93 1.734	3.84 1.851	0.164 (df = 2,90)	0.849
Do you highlight key information? (coursework)	mean SD	3.50 1.777	3.95 1.803	3.74 1.826	0.511 (df = 2,100)	0.602
Do you use repetition? (exam)	mean SD	3.95 1.953	4.31 1.808	4.11 1.685	0.292 (df = 2,89)	0.747
Do you use repetition? (coursework)	mean SD	2.96 1.777	2.90 1.843	3.19 1.795	0.240 (df = 2,99)	0.787
Do you skim read notes? (exam)	mean SD	3.85 1.443	3.95 1.571	4.13 1.405	0.219 (df = 2,91)	0.804
Do you skim read notes? (coursework)	mean SD	3.37 1.509	3.94 1.574	4.26 1.437	2.219 (df = 2,100)	0.114
Do you read intensively? (exam)	mean SD	3.33 1.489	3.45 1.603	3.05 1.868	0.485 (df = 2,91)	0.617
Do you read intensively? (coursework)	mean SD	3.70 1.404	3.26 1.823	3.00 1.818	1.035 (df = 2,100)	0.359
Do you use past exam papers? (exam)	mean SD	3.60 1.978	4.13 1.887	3.96 2.041	0.516 (df = 2,90)	0.599
Do you use charts and diagrams? (exam)	mean SD	2.28 1.824	3.41 1.902	2.59 2.370	2.666 (df = 2,89)	0.075
Do you use charts and diagrams? (coursework)	mean SD	2.17 1.952	2.78 2.108	2.12 2.049	1.226 (df = 2,99)	0.298

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

An analysis was then conducted to examine whether any differences existed between years for the motivation variables. The results may be found in Table 2.8.

Table 2.8: The means, standard deviations, F and p values for each motivation variable according to year of study

Variable		Year 1	*Year 2*	Year 3	F	p
Agency	mean	5.55	5.16	4.62	5.269	0.007**
	SD	0.869	1.007	1.228	(df = 2,99)	
Pathways	mean	5.15	4.60	4.26	3.965	0.022*
	SD	1.012	1.231	0.969	(df = 2,99)	
Hope	mean	5.35	4.88	4.44	5.048	0.008**
	SD	0.900	1.045	1.011	(df = 2,98)	
Extrinsic Motivation	mean	3.83	3.80	3.41	0.514	0.600
	SD	1.723	1.674	2.027	(df = 2,100)	
Intrinsic Motivation	mean	5.83	5.63	4.74	5.771	0.004**
	SD	1.114	1.248	1.403	(df = 2,98)	
Non-attendance at lectures	mean	5.39	5.31	4.55	2.164	0.120
	SD	1.438	1.738	1.920	(df = 2,100)	
Applications for extensions	mean	6.04	5.86	5.00	2.495	0.088
	SD	1.522	1.674	2.478	(df = 2,100)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

For each measure of motivation, a one-way ANOVA was conducted to determine whether any differences existed between the three years of study. Table 2.8 shows that there were no significant differences between years, in terms of extrinsic motivation, non-attendance at lectures and the rarity that students apply for extensions. Table 2.8 did show that there were significant differences between years for the "Hope" variable, $F(2,98) = 5.048$, $p = 0.008$**. Tukey's HSD revealed this difference to be between years one and three (0.006**). The component variable "Agency" was significant, $F(2,99) = 5.269$, $p = 0.007$**, and the component "Pathways" was also significant, $F(2,99) = 3.965$, $p = 0.022$*. Tukey's HSD revealed that for both "Agency" and "Pathways" this difference was between years one and three (0.005** and 0.016*, respectively). Table 2.8 shows that the means for "Agency", "Pathways" and "Hope" all show a decline from year one through to year three. The variable "Intrinsic Motivation" was significant,

$F(2,98) = 5.771$, $p = 0.004$. Tukey's HSD revealed this difference to be between years one and three (0.009**) and years two and three (0.011*). The means show that intrinsic motivation peaks in year one, followed by a slight decline in year two and drops in year three.

Analysis by Status

The study skills and motivation variables were then examined for differences between status (i.e. whether the student was a traditional student or a year out / mature student). An analysis was conducted to examine whether there were any differences between the groups, for frequency of use of study skills. The results follow in Table 2.9.

Table 2.9: The means, standard deviations, t and p values for each study skill frequency according to status

Variable		Traditional	Year Out / Mature Student	t	p
Do you plan study beforehand? (exam)	mean SD	3.65 1.470	4.12 1.505	1.500 (df = 96)	0.137
Do you plan study beforehand? (coursework)	mean SD	3.29 1.580	4.09 1.444	2.457 (df = 101)	0.016*
Do you do essential reading? (exam)	mean SD	3.88 1.478	4.23 1.516	1.055 (df = 92)	0.294
Do you do essential reading? (coursework)	mean SD	3.64 1.700	4.25 1.646	1.710 (df = 100)	0.090
Do you highlight key information? (exam)	mean SD	3.98 1.818	3.60 1.823	-0.970 (df = 92)	0.334
Do you highlight key information? (coursework)	mean SD	3.80 1.790	3.83 1.848	0.080 (df = 102)	0.936
Do you use repetition? (exam)	mean SD	4.31 1.740	3.94 1.892	-0.962 (df = 91)	0.339
Do you use repetition? (coursework)	mean SD	3.15 1.716	2.63 1.939	-1.374 (df = 101)	0.173
Do you skim read notes? (exam)	mean SD	4.05 1.513	3.81 1.424	-0.730 (df = 93)	0.467
Do you skim read notes? (coursework)	mean SD	3.92 1.504	3.83 1.623	-0.275 (df = 102)	0.784
Do you read intensively? (exam)	mean SD	3.27 1.694	3.33 1.589	0.162 (df = 93)	0.872
Do you read intensively? (coursework)	mean SD	3.15 1.749	3.55 1.697	1.089 (df = 102)	0.279
Do you use past exam papers? (exam)	mean SD	3.71 1.989	4.55 1.748	1.986 (df = 92)	0.050*
Do you use charts and diagrams? (exam)	mean SD	2.64 2.190	3.53 1.658	2.197 (df = 77)	0.031*
Do you use charts and diagrams? (coursework)	mean SD	2.11 1.953	3.26 2.088	2.712 (df = 101)	0.008**

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

For each study skill frequency, an independent t-test was conducted to determine whether any differences existed between the two groups. Table 2.9 shows that there were significant differences for the study skills: "Plan study beforehand" when studying for coursework, "Past exam papers", and "Charts and diagrams" for both exam and coursework. The other study skills were not found to be significant. The study skill "Plan study beforehand" was found to be significant for coursework scores, t(101) =

2.457, p = 0.016*. The means show that the Year Out / Mature students used this study skill more frequently than the Traditional students. There was a significant difference between the two groups for the study skill " Past Exam Papers", t(92) = 1.986, p = 0.050*. The means indicate that Year Out / Mature students use past exam papers more frequently than Traditional students. There were also significant differences between the two groups, in terms of frequency of use of "Charts and Diagrams", for exam, t(77) = 2.197, p = 0.031*, and coursework, t(101) = 2.712, p = 0.008**. The means indicate that for both exam and coursework, Year Out / Mature students used this study skill more frequently than Traditional students. The motivations variables were then examined according to status and the results may be found in Table 2.10.

Table 2.10: The means, standard deviations, t and p values for each motivation variable by status

Variable		Traditional	Year Out / Mature Student	t	p
Agency	mean	4.95	5.47	2.270	0.025
	SD	1.039	1.154	(df = 101)	*
Pathways	mean	4.39	5.20	3.487	0.001
	SD	1.117	1.090	(df = 101)	**
Hope	mean	4.67	5.34	3.092	0.003
	SD	1.008	1.045	(df = 100)	**
Extrinsic Motivation	mean	3.77	3.48	-0.771	0.442
	SD	1.782	1.787	(df = 102)	
Intrinsic Motivation	mean	5.46	5.44	-0.069	0.945
	SD	1.315	1.366	(df = 100)	
Non-attendance at lectures	mean	5.00	5.30	0.819	0.415
	SD	1.757	1.759	(df = 102)	
Applications for extensions	mean	5.72	5.58	-0.349	0.727
	SD	1.987	1.821	(df = 102)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

For each measure of motivation, an independent t-test was conducted to determine whether any differences existed between traditional students and year out / mature students. Table 2.10 shows that there were significant differences between the two types of status for the variable "Hope", t(100) = 3.092, p = 0.003**. The component variable "Agency" was also found to be significant, t(101) = 2.270, p = 0.025.*, as was the other

component of "Hope": "Pathways", $t(101) = 3.487$, $p = 0.001$**. In all three cases the means indicate that year out / mature students are more motivated than traditional students. However, there were no significant differences between the two types of status in terms of "Extrinsic Motivation", "Intrinsic Motivation", "Non-attendance at lectures" and "Applications for extensions".

Analysis by Path of Study

An analysis was conducted to examine whether there were any differences between the paths of study, for frequency of use of study skills. The results follow in Table 2.11.

Table 2.11: The means, standard deviations, F and p values for each study skill frequency according to path of study

Variable		Single Hons	Joint Hons	Major / Minor	F	p
Do you plan study beforehand? (exam)	mean	3.73	4.04	3.67	0.466 (df = 2,94)	0.629
	SD	1.530	1.534	1.412		
Do you plan study beforehand? (coursework)	mean	3.55	3.44	3.61	0.071 (df = 2,99)	0.932
	SD	1.689	1.622	1.288		
Do you do essential reading? (exam)	mean	4.13	3.66	4.00	0.819 (df = 2,90)	0.444
	SD	1.572	1.505	1.279		
Do you do essential reading? (coursework)	mean	3.71	3.64	4.22	0.886 (df = 2,98)	0.416
	SD	1.833	1.680	1.338		
Do you highlight key information? (exam)	mean	4.14	3.58	3.54	1.171 (df = 2,90)	0.315
	SD	1.812	1.902	1.713		
Do you highlight key information? (coursework)	mean	3.94	3.38	3.88	0.876 (df = 2,100)	0.419
	SD	1.774	1.905	1.734		
Do you use repetition? (exam)	mean	4.26	3.92	4.26	0.326 (df = 2,89)	0.723
	SD	1.954	1.605	1.698		
Do you use repetition? (coursework)	mean	2.96	3.00	2.98	0.004 (df = 2,99)	0.996
	SD	1.842	1.774	1.815		
Do you skim read notes? (exam)	mean	4.06	3.66	4.13	0.743 (df = 2,91)	0.479
	SD	1.520	1.449	1.484		
Do you skim read notes? (coursework)	mean	3.86	3.78	4.17	0.450 (df = 2,100)	0.639
	SD	1.588	1.437	1.530		
Do you read intensively? (exam)	mean	3.50	3.22	2.98	0.800 (df = 2,91)	0.453
	SD	1.725	1.494	1.710		
Do you read intensively? (coursework)	mean	3.26	3.46	3.04	0.352 (df = 2,100)	0.704
	SD	1.895	1.436	1.681		
Do you use past exam papers? (exam)	mean	3.73	3.84	4.54	1.452 (df = 2,90)	0.240
	SD	2.004	2.183	1.466		
Do you use charts and diagrams? (exam)	mean	3.13	2.98	2.43	0.861 (df = 2,89)	0.426
	SD	2.009	1.955	2.283		
Do you use charts and diagrams? (coursework)	mean	2.62	2.46	2.11	0.492 (df = 2,99)	0.613
	SD	2.067	1.979	2.184		

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

For each study skill, a one-way ANOVA was conducted to determine whether any differences existed between the three paths of study (Single Honours, Joint Honours and Major or Minor). Table 2.11 shows that there were no significant differences between paths of study for any of the study skills. An analysis was then conducted to examine

whether there were any differences in motivation between the three paths of study. The results may be found in Table 2.12.

Table 2.12: The means, standard deviations, F and p values for each motivation variable according to path of study

Variable		Single Hons	Joint Hons	Major / Minor	F	p
Agency	mean	5.18	5.02	5.03	0.235	0.791
	SD	1.219	0.915	0.993	(df = 2,99)	
Pathways	mean	4.70	4.57	4.53	0.212	0.809
	SD	1.286	0.993	1.035	(df = 2,99)	
Hope	mean	4.93	4.81	4.78	0.223	0.801
	SD	1.172	0.921	0.924	(df = 2,98)	
Extrinsic Motivation	mean	3.54	4.16	3.54	1.147	0.322
	SD	1.690	1.972	1.793	(df = 2,100)	
Intrinsic Motivation	mean	5.54	5.40	5.23	0.436	0.648
	SD	1.383	1.041	1.478	(df = 2,98)	
Non-attendance at lectures	mean	5.06	5.12	5.08	0.011	0.989
	SD	1.867	1.716	1.586	(df = 2,100)	
Applications for extensions	mean	5.80	5.64	5.37	0.392	0.677
	SD	1.826	2.059	2.081	(df = 2,100)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

For each measure of motivation, a one-way ANOVA was conducted to determine whether any differences existed between the three paths of study. Table 2.12 clearly shows that there were no significant differences in terms of motivation.

2.4: Discussion

The discussion will follow the subsequent pattern. Firstly, the results from the analysis of the entire sample will be discussed. An analysis of each of the independent variables will follow including, gender, year of study, status and path of study. Each analysis will examine frequency of use of study skills for both exam and coursework, followed by an analysis of the motivation and commitment to study variables.

In terms of how frequently study skills are used, the results showed that when studying for exams, students use repetition more than any other study skill detailed in the questionnaire. However, when studying for coursework, repetition is one of the least frequently used study skills. Although, approaches to learning are dynamic and changeable, there is research to suggest that students adopt a core approach, which is used, if possible, as a default (Schmeck, 1983; in Vermetten, Lodewijks and Vermundt, 1999). This suggests that, if repetition is students' main technique for learning, they may not necessarily be learning the information for coursework. It is possible that students who favour surface study skills may not be engaging with learning material for coursework and may be simply reproducing the information, changing it very little from its original format. For exams, the learning material must be held in memory, so the verbal or written repetition must result in learning, to be effective. However, when writing coursework no such memorisation is necessary. The student may simply reproduce the material without actually engaging with the material and learning. Charts and diagrams are the least frequently used study skills, however, there is the greatest variation in scores for both exam and coursework. The most frequent study skill for coursework is skim reading. In terms of motivation, Agency was found to be higher than Pathways, which means that students are being driven towards their goals to a greater extent than they are motivated to overcome obstacles in their way. Intrinsic motivation is higher than extrinsic, thus meaning that students seek internal rewards rather than extrinsic ones for their efforts.

Gender Differences

The results indicate than with the exception of the study skill "Charts and diagrams" (for exam and coursework), females used the study skills more frequently than males. However, the only study skills to reach statistical significance were "Essential reading", "Highlight key information" and "Skim read". "Highlighting key information" and "Skim reading" can be defined as surface study skills as they do not involve active engagement with the learning material, there is little focus on meaning and the information is not transformed from its original state. This means the results do not support the findings of Biggs (1987), who found that males scored higher than females on surface strategies. Biggs also found that females score higher on the achieving approach. This was not supported, as there were no significant gender differences between strategic study skills such as "Plan study beforehand" and use of "Past exam papers". Females did score higher than males on their frequency of use but this did not reach significance. In the current study neither Hope, nor the two component variables, Agency and Pathways were found to be significant in terms of gender differences. Therefore, this study found no differences between sexes in motivation, in terms of being driven towards goals and the determination to problem solve to get past obstacles between the individual and their goal. This does not support the findings of Jacobs and Newstead (2000), who found females to be significantly more motivated than males. Females did score higher than males on the Hope scale but this was not found to be significant. The result does support the findings of Zeegers (2001) who examined motivation using the SPQ on Australian tertiary education students and found there to be no gender differences. The finding also supports those of Severiens and Dam (1994; in Meyer, 1995) who concluded there is little systematic evidence of gender differences, after conducting a meta-analysis. This study found females to be significantly more intrinsically motivated than males, but extrinsic motivation was not found to be significant. Females are also significantly less likely to miss lectures and less likely to apply for extensions. This suggests that females are more committed to study than males and that they seek internal rewards rather than external ones. This may be due to females having a greater amount of opportunities open to them than previous generations. As Higher Education used to be male dominated,

females may feel that a greater level of commitment is required of them, if they are to succeed.

The gender differences in study skill use found in the present study were not supported by the literature but it should be noted that little research has been done to examine individual study skills. Although only three, out of the eight study skills in the questionnaire, were found to be significant, females scored higher than males on all study skills except "Charts and diagrams". It is possible that gender differences do exist in terms of use of specific study skills but that such differences are 'evened out' when encompassed within approaches to learning. Although there were no significant differences in Hope scores, females also scored consistently higher on all of the motivation and commitment scales. This study did, however, have its limitations, only a third of the sample are male and this may have an influence on the final results, as the sample of males may not have been representative of the population. It would be interesting to further examine specific study skills and techniques for gender differences in future research. If females are, in fact, more motivated and committed than males, it would follow that they would perform better in terms of grades. A future study to examine study skill use, motivation, commitment and degree performance would give a fuller picture.

Changes through the degree course

The study found no significant differences in the use of study skills, between the three years of study. This implies that students do not change their techniques as they progress through the degree course. This does not support the findings from a number of researchers who have suggested that student learning is dynamic and amenable to change (Busato et al, 1998; Watkins and Hattie, 1985; Vermetten et al, 1999; Volet et al, 1994; cited in Zeegers, 2001). Zeegers (2001) argues that students see their degree courses, particularly in the first year, as a survival course and they change their study methods to suit the needs of the task. The results also do not support the findings of Harper, Kember and Richardson (1995; cited in Zeegers, 2001), who discovered that older students use more elaborate and refined study strategies when compared with their younger

colleagues. This suggests that as students get older and progress through the degree course, they would refine and change their techniques. So one might expect to find differences in study skill use between the years, but this study did not. Although this study did not examine approaches to learning using the instruments designed by Biggs and Entwistle et al, each of the eight study skills in the questionnaire, can be categorised into these 'types' (i.e. deep, surface and strategic). There were no significant differences between years with regard to the study skills "Plan study beforehand" and "Past exam papers" which may be regarded as strategic or 'achieving' strategies. This study, therefore, does not support the findings of Zeegers (2001) who found that use of achieving strategies declined as students progressed through the degree course. The only deep study skill on the questionnaire was "Read Intensively" and there were no significant differences. This did not support the findings of Watkins and Hattie (1985; in Zeegers, 2001), who used the ASI to find that deep scores declined from first to third year.

In terms of motivation, Hope was found to be significant, as were its component variables: Agency and Pathways. Although the significant differences were only between first and third year, the means showed a decline from year one through to year three. This does not support the findings of Jacobs and Newstead (2000), who found that motivation reduces significantly after the first year but recovers in the third year. Although this study did find that motivation decreased after first year, this was not significant, and it was also found that motivation continues to decrease into the third year. This does not support the notion of 'exit velocity' suggested by Jacobs and Newstead (2000). Exit velocity describes an increase in student activity and motivation just prior to course completion. Such a decrease in motivation, particularly from first to second year, could be explained due to students entering university with unrealistic expectations. Students may find that they were unrealistic about their ability to study independently without the structure, deadlines and support given to them by teachers at school or in Further Education. The results may also be explained by the student having thought the course would be more interesting, which could lead to disillusionment and a decrease in motivation. They may also have doubt in their own academic ability with the increased

workload demands placed on them by Higher Education. However, such a decrease in motivation across the whole degree course has serious implications. One explanation could be that students have good intentions regarding their work, but in reality do not put in the work that they originally plan to. This "I'll start tomorrow" philosophy, could explain the further decrease in motivation in third year as until this point in the course, students could have the attitude that they will work hard when it is really necessary. First year marks often do not count towards students' final degree and second year represents a lower percentage of the final mark than third year. Upon reaching the third year, students may find it difficult to put in the work that they had planned to, thus resulting in a decrease in motivation. Extrinsic motivation was not significant between the three years; however, intrinsic motivation was found to be significant. Intrinsic motivation stayed relatively stable across years one and two and then decreased significantly in year three. There were no significant differences between years with regard to attendance at lectures or applications for extensions. This did not support the findings of Harper, Kember and Richardson (1995; cited in Zeegers, 2001), who found that older students are generally more committed to their study.

The effect of having a break in education

The present study found some differences between traditional students and students who had taken a break in their study, in terms of study skills. The study skills "Plan study beforehand" (for coursework only), "Past exam papers", and "Charts and diagrams" were used more frequently by year out or mature students, than traditional students. The other study skills were not found to be significant. The finding that the strategic study skills "Plan study beforehand" and "Past exam papers" were significant supports Zeegers (2001), who found that older students use different approaches from their younger colleagues and are consequently, more successful. Harper, Kember, Richardson (1995; cited in Zeegers, 2001) also found that older students use more elaborate study approaches. The finding that "Highlighting", "Skim Reading" and "Repetition" (which are all classed surface study skills) were not found to be significant, does not support the findings of Biggs (1987). He found that students' use of the Surface approach decreases until the mid-twenties where it stabilises, until after the age of 39, when there is a

considerable decline. Also the results do not support Zeegers, Martin and Martin (1999) who found that older students scored lower on surface approaches, when they conducted a longitudinal study into first year science students. The finding that there was no significant difference between the two groups, in terms of the deep study skill "Read Intensively", did not support Zeegers, Martin and Martin 1999) who found that older students use deep approaches more than their younger colleagues. Biggs (1987) also suggested that mature students are more likely to adopt deep strategies as they are more readily acquired in real life than in the classroom.

The Hope scale was found to be significant, as were its components: Agency and Pathways. In each case year out and mature students scored higher than traditional students. This supports the findings of Richardson (1994), who found that taking a break from education, even for just one or two years, has a positive impact on approach to learning. He found that year out and mature students favoured a deeper approach to learning and therefore have 'deep' motives, which are superior to surface motives. This finding is also consistent with Richardson (1994) who argues that older students have greater maturity and show greater motivation. The other motivation scales and commitment scales were not found to be significant. The greater motivation of mature students may be because many students who have taken a break in their education are mature students, and as Biggs (1987) points out, the material and psychological costs of entering Higher Education increase with age. Mature students often have commitments such as families and employment to consider and financing the degree itself may be more of an issue than it may be for traditional students. Mature students have to make a conscious decision to go to university, whereas for many traditional students, university is seen as a logical progression from sixth-form college. Biggs (1987) argues that younger students are more instrumentally or pragmatically motivated and suggests that they may have the 'meal-ticket' mentality". Year out students may also be more mature than traditional students, as they have spent some time in the so-called 'real world' away from a life of education. This may lead to them having clearer ideas about their future and greater determination to succeed.

Path of Study

The present study did not find any significant differences between the three types of path of study (single honours, joint honours and major/minor) and there does not seem to be any research into differences between these groups in British universities. The results indicate that there are no significant differences in study skill use, motivation and commitment, between students taking the various paths of study. The researchers do not feel that further research is required into this area.

Conclusion

The study produced a number of interesting findings. Although there were some significant gender differences for study skills and commitment, there were no significant differences in terms of Hope. There were no study skill differences between years, but motivation was found to decrease throughout the degree course, which has concerning implications. Students who took a break in their education were found to be significantly more motivated than traditional students and there were no differences found between the three types of degree classification. Although it will not be possible in the scope of this study, it would be of great benefit to investigate the use of study skills, motivation and commitment and their interaction with degree performance. It would be particularly interesting to investigate whether the increased motivation and commitment of mature students, resulted in improved performance, when compared with traditional students.

Having only eight study skills in the questionnaire means that this study is limited. There were three study skills which could be defined as "Surface", two study skills which could be defined as "Strategic" or "Achieving", and only one study skill which could be defined as a "Deep" study skill. To examine study skill use in relation to the previous literature and research with the ASI and SPQ, it would be beneficial if there were more of each study skill type. A larger sample would also be beneficial, in order to compare the various subjects to see if any differences exist. It was also decided that the questionnaire should only ask for the students' main subject of study, as the results would be more manageable. This would be particularly important if comparing subjects. The section in

the questionnaire where students were asked to identify their main method of study (please see Appendix 5 for a list of responses), revealed a great variety of study skills, which could be used to inform a more detailed questionnaire. An analysis of the frequency of use of more study skills would be useful, as there is currently little research evidence into this specific area.

The commitment scales on the questionnaire were put in place because the Hope scale is a more abstract scale, based on statement such as "I will ...". As mentioned in the discussion there may be inconsistencies between students' intentions and their actions. The commitment scales in this present study, however, were not very useful, particularly for mature students, as they may miss lectures and ask for extensions for very different reasons than traditional students. The purpose of an extension is to allow a student more time to complete an assignment in extenuating circumstances, for example if a student has been ill. However, this measure implies that the only students applying for extensions are those who are disorganised and unable to meet deadlines. This is clearly not the case so therefore this measure will not be used in future study.

Alternatively, it may be useful to include other scales such as a measure of the number of hours spent on independent study each week or how early students begin revision or coursework assignments. Therefore, the next study will involve a greater range of study skills, commitment scales and a comparison of subjects.

2.5: Study 2 – A further investigation into study skill use

Following the findings of the previous questionnaire, it was thought that a number of issues were raised that could benefit from further investigation. The primary focus of this questionnaire is threefold: firstly to investigate the frequency of use of a wider range of specific study skills, secondly to adapt the commitment to study section of the questionnaire and thirdly to further investigate individual differences, particularly in respect of year of study, student status and the effect of the subject studied (which was not analysed in the previous study). The pilot questionnaire was limited in the sense that it only included eight study skills and it was thought that the inclusion of a greater range of study skills could provide a better insight into student study behaviour.

The pilot questionnaire included a free text section where students could detail their main method of study. This was not included in the results section but a list of responses can be found in Appendix 5. This item was included to gain a greater understanding of the exact skills that students use and will be used to used to inform the present study. The inclusion of more study skills will be also allow comparison within the framework of approaches to learning, as suggested by Marton and Saljo (1976). As mentioned in the literature there has been a wide concurrence on the framework, which identifies deep, surface and strategic study skills. If more study skills are included in this study, where appropriate these may be grouped into the three categories, so then the findings of the current study may be compared with past research. The study skills will also be analysed individually, as this study has identified a need to examine the frequency of individual study skills rather than just approaches to learning. Adding more study skills could also mean that other elements may be measured for example the frequency of use of mnemonics. Overall if a greater range of study skills is included in the questionnaire, students will be able to report a fuller picture of what they do when they go about their study.

The pilot study highlighted a need to expand the commitment to study section of the questionnaire. The only significant differences for the variable "Application for

Extensions" were that males apply for extensions more often than females. This item was eliminated from the following study because it was not deemed to be an appropriate measure of commitment. The number of extension applications a student makes could depend on a number of reasons. The item was included because it was assumed that those students who applied for more extensions were disorganised and less committed to their study. However, it is also possible that students are using extensions for their intended purpose, meaning that circumstances beyond their control are affecting their ability to submit a piece of work. There may also be subject differences, as some departments will give extensions more readily than others. Although non-attendance at lectures was only significant in terms of gender, this was thought to be a better form of measuring student commitment. It was thought that to gain a greater understanding of commitment to study this section should be expanded. The following questionnaire will include the number of hours that a student (on average) studies per week. This was thought to be a better measure of commitment than extensions. It was also thought that how early a student begins studying for exams and coursework would be a useful measure. Although "Hope" and "Agency" and "Pathways" are useful measures of motivation they tend to be "I will ..." statements rather than "I do ...". There was concern from the experimenter that most students have very good intentions but that these intentions do not necessarily turn into actions. These new measures should show a little more about the reality of what the students are actually doing, rather than what they intend to do before they finish their degrees.

The individual differences to be examined will not include gender. Although the pilot study highlighted some areas of interest, it was felt that with the limited nature of the investigation, that this was not a priority. Year of study and status will be examined once again with a wider range of study skills and a greater number of participants. Both of the independent variables will be examined in terms of approaches to learning, so comparison may be made with past research. The significant effects of having a break in one's study will be examined further with the inclusion of a distinction between year out and mature students. Richardson (1994) found that taking a break from study, even for only one or two years, has a favourable impact on student learning and it will be

interesting to see whether this is supported by this study. Path of study will not be included as no significant differences were found in the pilot, however, the students' main subject of study will be examined in this investigation.

On the pilot questionnaire students responded to all of the study skill items for each subject studied. This caused problems in that some students only studied one subject and therefore only completed one side of the questionnaire. This made analysis of results problematic and also meant that it would be difficult to compare students studying various subjects. This questionnaire will overcome these problems by asking the participants to complete the questionnaire for their main subject of study only. This study will investigate such differences between these subjects.

2.6 Method

Design

A questionnaire was used to investigate the methods that students employ when they study. This questionnaire consisted of three parts: the first section recorded demographic information and the second section examined the frequency of use of particular study skills, for both exam and coursework. The final section measured academic motivation and commitment to study. The independent variables in the study were year of study, student status (i.e. traditional, year-out or mature) and main subject of study. The dependent variables were scores on study skill frequency and motivation.

Participants

There were 835 participants in the study, all of whom were undergraduates at Chester College in the North West of England. The age range was 18 to 79 and the mean age was 21 years. Following the results of the previous study it was agreed that a measure of gender was not necessary. There were 357 first year students, 258 second year students, 207 third year students and 12 students who gave no indication of year of study. In terms of status, there were 569 traditional students, 134 students who had taken a year out, 33 mature students and 13 students who did not respond to this item. With regard to subject of study, the questionnaire required participants to indicate their main subject of study. In Table 2.13, there is a breakdown of the number of participants from each subject area.

Table 2.13: A breakdown of the number of participants from each subject area

Subject	Number of participants in the study
Psychology	136
English	128
PE and Sports Science	126
Biology	104
Geography	81
History	41
Theology	37
Drama	35
Maths	35
Art	34
Languages	14
Computer Science	13
Health and Community Studies	12
Business	11
Education	6
Nursing	3
No Response	19

It is clear from the table that the majority of the participants are from Psychology, English, P.E. and Sports Science, Biology and Geography. When comparisons are to be made between subjects, it was agreed that these five subjects would be compared and that the other subjects would be excluded due to the comparatively smaller sample size. However, two additional comparisons were also used to include the remainder of the subjects: Arts versus Science, and Psychology compared with all other subjects as a group. As Psychology students study the learning process as part of their degree, it was thought that they might go about studying in a different manner than other students. Also Psychology students are often recruited as participants in learning investigations due to their availability in Psychology laboratories. However, if Psychology students approach learning differently, then study techniques which benefit them may not necessarily benefit other students. All of the participants were recruited by opportunity sampling. To ensure that participants were treated according to BPS guidelines, they were assured that confidentiality and anonymity would be maintained and that they were free to withdraw from the study at any time.

Materials

The questionnaire was designed by the researchers, although, the final section was adapted from Snyder's Hope Scale (2000). A copy of the questionnaire may be found in Appendix 7. The questionnaire also had an appendix attached, which defined the mnemonic study skills that might be unfamiliar to students. The cover sheet of the questionnaire served a number of functions. Firstly, it thanked the participant for taking part and assured them of confidentiality and that their responses would be used for the sole purpose of research and would be pooled anonymously with responses from many others. The participant was invited to take part in a follow up study and a tick-box was provided for their response. The cover sheet also advised the participant that they might leave the investigation at any point and they were referred to the appendix should they encounter any unfamiliar terms.

The main questionnaire consisted of three main sections: the first requiring demographic information. It was constructed taking into account the findings of the previous study. Firstly, it was thought that the demographic information provided should include age, year of study and whether the student has had a break in their education, as found on the previous questionnaire. However, there was an additional option included for year of study, as there was no tick-box for postgraduate students in study one. Also, it was thought that it might be interesting to expand the item referring to whether the student has had a break in their education. The item was changed to include tick-boxes for traditional students, 'year out' students and mature students. The main subject of study was included, as in study one the first and second subject caused problems with analysis. Finally the student number (a unique identifier number assigned by the College) was requested. If the student indicated that they were interested in being involved in further investigations, they could be contacted, as this student number is used for the student's email.

The second section of the questionnaire required ratings of frequency of use for a total of 45 different study skills. Following the results of the previous study, a questionnaire was

designed to investigate a greater range of study skills. The additional study skills included were informed by the results from a question on the previous questionnaire enquiring as to what was the students' main method of study. This open-ended question produced a list of study techniques (a copy of which, may be found in Appendix 5). These study techniques were included as were the study techniques advocated by study skill handbooks found in the College library. Information was collected on frequency of use of each of the study skills, for exam and coursework separately. Thus, meaning that there were a total of 88 items in this section, as study skills 40 and 45 were only applicable to exams. Frequency of use was measured on a scale ranging from 1 to 7 (1 being never, 7 being always) and only the extremes were labelled. In order to treat the data on an interval scale, this information was recoded in SPSS to 0-6, with 0 indicating that the study skill is never used, and 1-6 indicating that the skill is used and allows a frequency measure (6 being always). The 45 skills were categorised into different types of study skills. These included deep, surface and strategic study skills, and the types of questions were mixed throughout this section of the questionnaire. Deep study skills refer to those methods of learning that require an active engagement with the material to be learnt. They focus on understanding the author's message and how this relates to other concepts or theories through critical evaluation. Table 2.14 lists the questions that examine 'deep' study skills.

Table 2.14: Deep Study Skills

Question No.	Deep Study Skill Questions
5	Do you discuss ideas with friends or people on your course?
9	Do you read intensively paying attention to detail?
16	Do you summarise your notes?
38	Do you formulate arguments for and against the author's views?
39	Do you try to form your own opinions on key issues?
41	Do you pose questions for yourself?
42	Do you test yourself?

In contrast, surface study skills only require a passive engagement with the learning material in that the information is not transformed from its original state. Surface study skills tend to include reproducing orientations such as mental repetition or written or verbal rehearsal. Table 2.15 details the items in the questionnaire, which constitute surface study skills. The surface study skill score (exam and coursework combined) is calculated by taking an average score of all 14 items. The surface study skill exam score is calculated by taking an average score of the 7 items relating to exams and the surface coursework score is calculated by averaging the seven items relating to coursework.

Table 2.15: Surface Study Skills

Question No.	Surface Study Skill Questions
7	Do you skim read?
10	Do you verbally rehearse material?
12	Do you rewrite lecture notes?
22	Do you use highlighting?
23	Do you use underlining?
26	Do you use repetition of notes?
37	Do your rehearse information mentally?

Strategic study skills are concerned with organising study to ensure maximum efficiency. They include methods such as organisation of time and resources and ensuring they are

used to the maximum effect. The Strategic study skills used in the questionnaire are detailed in Table 2.16. Please note that two of these questions referred to exam only.

Table 2.16: Strategic Study Skills

Question No.	Strategic Study Skill Questions
8	Do you preview material focusing on headings, diagrams, tables, chapter reviews and summaries?
15	Do you categorise your notes?
18	Do you keep your notes organised in folders?
40	Do you question spot (i.e. guess which questions will come up on the exam and mainly revise those areas)? (EXAM ONLY)
43	Do you plan your study beforehand (e.g. timetable)?
44	Do you make essay plans before writing?
45	Do you use past exam papers? (EXAM ONLY)

There were four items in the questionnaire to measure the frequency of use of mnemonic techniques in student learning. The questions are listed below in Table 2.17. Questions 34-36 referred the participant to an appendix on the questionnaire, which offered a fuller explanation and examples of the techniques. A copy of this can be found in Appendix 7 and was attached to the end of the questionnaire.

Table 2.17: Mnemonic Questions

Question No.	Mnemonic Questions
33	Do you use things in threes?
34	Do you use memory walks?
35	Do you use a peg word system?
36	Do you use the first letters of words as a memory aid?

The final category of study skills to be analysed were skills, which are elements of a particular study skill called the mind map technique. These "mind map relevant" skills

were identified so questions could be asked out their frequency of use. They are detailed below in Table 2.18.

Table 2.18: Mind Map Relevant Questions

Question No.	Mind Map Relevant Questions
17	Do you condense notes into their simplest form (such as key words or onto cue cards)?
20	Do you use bullet points or numbering?
21	Do you use three or more colours in your notes and diagrams?
24	Do you use images in your notes?
25	Do you use symbols in your notes?
27	Do you make spider diagrams?
28	Do you make wall charts to help you remember material?
30	Do you use mind maps / knowledge maps / concept maps?
31	Do you make diagrams, which show connections between concepts (using arrows, lines etc)?
32	Do you organise spacing in diagrams?

The final page of the questionnaire was concerned with academic motivation. Snyder's (2000) Hope Scale was adapted for use in Higher Education by the researchers. This adapted by substituting some of the words, for example the term "school work" was changed to "degree". The participant was presented with a series of statements and they were required to indicate how applicable each statement was to them. These may be found in Table 2.19. For the first 10 items, scores were measured on a scale of 1-7, with 1 being "definitely false" and 7 being "definitely true". Only the extremes were labelled. The Agency score is concerned with statements 1, 3, 5 and 8, and the Pathways scores is concerned with statements 4, 6 and 9 from the final page of the questionnaire. Agency and Pathways scores are combined in order to calculate a Hope Score. The additional components on this page of the questionnaire were devised by the experimenter and include: an item (2) to measure Extrinsic Motivation and an item (7) to measure Intrinsic Motivation. There was also a statement to measure the student's commitment (10) in terms of how frequently they miss lectures.

The commitment section also included a statement to measure how many hours per week the student spends on independent learning (11). The final two statements asked participants how early they begin studying for both coursework (12) and exam (13). The options include: as soon as the work is set, a month before, a fortnight before, a week before, two or three days before and the night before.

Table 2.19: Motivation Statements

Statement Number	Type of Statement	Motivation Statements
1	Agency	I am keen to get a good mark in my final degree.
2	Extrinsic Motivation	I am motivated by other people's expectations rather than my own.
3	Agency	I am determined to work hard in my study to achieve my desired outcomes / career aspirations.
4	Pathways	Even if the course is difficult, I find a way to succeed.
5	Agency	For each module I put in as much effort as possible.
6	Pathways	I think of lots of ways to make good grades.
7	Intrinsic Motivation	I need to achieve goals for myself more than anyone else.
8	Agency	I nearly always get the grades I want in my academic work.
9	Pathways	There are lots of ways to meet the challenges of my modules.
10	Commitment	I very rarely miss lectures
11	Commitment	I spend approximately __ hours per wee on independent learning. (Insert number of hours)

Procedure

Following the results of the previous study, a questionnaire was designed to investigate a greater range of study skills. The participants were asked to estimate, how frequently they use each learning technique when studying for exams and coursework. The respondents were given 7 options. They were told that if they never used the technique, they should select the box with 1 (Never) next to it but if they always used the technique when studying for either exam or coursework, they should select 7 (always). The participants were also given the option of selecting 5 other responses in between these

two extremes, which were not labelled. This gave the participant the opportunity to judge the frequency of their actions and an estimate was to be given on the Likert type scale. The questionnaire directed participants to read each item and to select a response by putting an X in the appropriate box. This was to be done only for the student's main subject of study, for both exam and coursework.

Lecturers, from all of the subjects listed in Table 2.13 (with the exception of Business, Education, Nursing and Health and Community Studies), were contacted to ask if questionnaires could be distributed in their lectures. This was done for each of the three years in each subject and participants were asked if they would complete the questionnaire. They were asked to ensure they read the first page, which assured participants that their responses were confidential and would be pooled anonymously, for academic purposes only. The participants' attention was also drawn to a tick box, where participants' could indicate if they were interested in further research, which may include study skills training. Participants were assured that they could leave the investigation at any time and for any reason. The questionnaire itself explained how the responses were to be made. It indicated that participants should read each statement and select the response that was most applicable to them by putting a cross in the most appropriate box. The experimenter also drew attention to the appendix, which served the purpose of explaining any unfamiliar terms. After completion, participants were thanked for their contribution. The questionnaires were designed and scanned using Formic 3 and analysed using Excel and SPSS v.11.

2.7 Results

Study skill frequency

The entire sample was analysed to find frequencies, the mean and the standard deviation for each study skill used when studying for exam and coursework. The results may be found in Appendix 8. The individual study skills ranged in frequency, with the lowest scoring (having a mean less than 1), being the use of memory walks and the peg word system, for both exam and coursework. The study skills with the highest frequency (having a mean which was over 5) were taking lectures notes, for both exam and coursework and also the use of the library, but for coursework only. The results section will continue to examine the entire sample for frequency of use for the types of study skills and the motivational variables. The results will then include a breakdown of each of these study skill types and motivational variables, by year of study, status and main subject of study. Table 2.20 provides the means and standard deviations for the entire sample, for each study skill type.

Table 2.20: A table to show the means and standard deviations for the frequency of each study skill type

Study Skill Type	Mean	SD
Deep exam	3.659	1.022
Deep coursework	3.531	0.965
Surface exam	3.502	1.036
Surface coursework	3.225	0.996
Strategic exam	3.691	0.982
Strategic coursework	3.826	1.102

It can be seen from Table 2.20 that "Strategic" study skills are the most frequently used, followed by "Deep" study skills, which are used more frequently than "Surface" study skills. It is clear from Table 2.20 that both "Deep" and "Surface" study skills are used more frequently when studying for exams than for coursework, whereas the reverse is

true for "Strategic" study skills. The frequencies (in Appendix 8) indicate that the most frequently used Deep skills involved forming opinions, testing oneself for exams and discussing ideas with colleagues. The least frequently used Deep skills were all concerned with coursework study and included: summarising notes, testing oneself and posing questions for oneself. The most frequently used Surface skills included underlining, skim reading, highlighting, and mental repetition (for exams only). The least frequently used Surface skills were all concerned with coursework and included repetition, verbal rehearsal, rewriting of lecture notes and condensing of notes. The mean and standard deviation of the entire sample, for each motivation variable is presented in Table 2.21.

Table 2.21: The means and standard deviations for each motivation variable

Motivation Variable	Mean	SD
Agency	5.589	0.856
Pathways	5.081	0.934
Hope	5.337	0.816
Extrinsic	4.080	1.715
Intrinsic	5.640	1.403
Miss Lectures?	5.770	1.439
Hours of study	13.710	9.009

It can be seen from Table 2.21 that the mean "Agency" score is higher than the mean "Pathways" score (the "Hope" score is a combination of the two), yet there is similar variation in the scores, in terms of the standard deviations. In the entire sample intrinsic motivation scored higher than extrinsic motivation. The average number of hours spent studying per week was 13.710, however there was a very large standard deviation of 9.009, indicating a wide variation in scores. Table 2.22 below details the median and range for the entire sample, in terms of when students begin studying for examinations and coursework.

Table 2.22: The median and range for the entire sample, in terms of when students begin studying for exams and coursework

Variable	Median	Range
Begin exam	3	5
Begin coursework	2	5

The ranges show that all of the possible response options were used by the participants (there was a total of 6). The medians show that students begin working on coursework earlier than they begin studying for exams. The median score for exams shows that students begin studying a fortnight beforehand (3), whereas for coursework students begin working a month before it is due in (2).

The frequency of use of mnemonics

Four of the items on the questionnaire examined the frequency of use of mnemonics and participants were required to indicate frequency of use, for exam and coursework. The results may be found in Table 2.23 below. The table shows the frequency of use of mnemonics to be relatively low, when compared with the frequency of use of other study skills

Table 2.23: The means and standard deviations of the frequency of use of mnemonics overall and exam and coursework

Variable		Mean	SD
Mnemonic	exam	1.270	1.052
Mnemonic	coursework	1.170	1.150

Mind Map Relevant Questions

Ten of the items on the questionnaire examined the frequency of use of mind map relevant study techniques and participants were required to indicate frequency of use, for exam and coursework. The results may be found in Table 2.24 below.

Table 2.24: The means and standard deviations of the frequency of use of mind map relevant study skills

Variable	Mean	SD
Mind map relevant skills (exam)	2.76	1.202
Mind map relevant skills (coursework)	2.54	1.161

Table 2.24 shows that mind map relevant skills are used more frequently when studying for exams than coursework. The skills are used more frequently than mnemonic techniques, but the frequency of use is relatively low when compared to deep, surface or strategic techniques.

Analysis by year of study

The study skill frequencies and motivation variables were then examined according to year of study. Table 2.25 shows a breakdown of the study skill types for exam and coursework by year of study.

Table 2.25: A breakdown of study skill types by year of study

Variable		Year 1	Year 2	Year 3	F	p
Deep exam	mean	3.55	3.67	3.81	4.151	0.016*
	SD	1.035	0.962	1.064	(df = 2,755)	
Deep coursework	mean	3.49	3.50	3.63	1.479	0.229
	SD	0.978	0.922	0.996	(df = 2,755)	
Surface exam	mean	3.51	3.49	3.50	0.043	0.958
	SD	1.004	1.037	1.107	(df = 2,768)	
Surface coursework	mean	3.33	3.16	3.11	3.762	0.024*
	SD	0.951	0.990	1.072	(df = 2,777)	
Strategic exam	mean	3.56	3.80	3.79	5.653	0.004**
	SD	0.971	0.945	1.038	(df = 2,767)	
Strategic coursework	mean	3.74	3.88	3.89	1.640	0.195
	SD	1.079	1.096	1.105	(df = 2,778)	

* indicates significance at the 0.05 level , ** indicates significance at the 0.01 level

Table 2.25 indicates that several variables reached significance at the 0.05 level, when a one way ANOVA was applied to examine year of study. The frequency of use of "Deep" study skills for exam differed significantly between years, $F(2,755) = 4.151$, $p = 0.016$*. Tukey's HSD revealed that the significant difference exists between years one and three ($p = 0.012$*). The means indicate that the frequency of use of "Deep" study skills, when studying for exams, increases as the degree course progresses. There were significant differences between the years, in the use of "Surface" study skills, when studying for coursework, $F(2,777) = 3.762$, $p = 0.024$*. Tukey's HSD revealed that this difference was between years one and three ($p = 0.032$*). The means indicate that use of "Surface" techniques when studying for coursework decreases after year one, and that from year two to year three the frequency of use remains relatively stable. The frequency of use of "Strategic" study skills when studying for exams, was also significant between years, $F(2,767) = 5.653$, $p = 0.004$**. Tukey's HSD revealed that this difference was found to be between years one and two (0.008**) and years one and three (0.026*). The means indicate that use of "Strategic" techniques when studying for exams, increases after year one but from year two to year three, the frequency of use remains stable. There were, however, no significant differences between years in terms of "Deep" or "Strategic" study skills when studying for coursework and there were no significant differences in terms of "Surface" study skills when studying for exams.

After analysis of the study skill types, the motivation variables were examined according to year of study. The results may be found in Table 2.26.

Table 2.26: The means, standard deviation, F and p values after performing a one-way analysis of variance on motivation variables, by year of study

Dependent Variable		Year 1	Year 2	Year 3	F	p
Agency	mean	5.67	5.54	5.52	2.680	0.069
	SD	0.793	0.818	0.973	(df = 2,806)	
Pathways	mean	5.16	4.96	5.09	3.322	0.037*
	SD	0.853	0.919	1.037	(df = 2,804)	
Hope	mean	5.42	5.24	5.31	3.478	0.031*
	SD	0.741	0.781	0.936	(df = 2,799)	
Intrinsic	mean	5.68	5.57	5.69	0.565	0.569
	SD	1.360	1.400	1.460	(df = 2,809)	
Extrinsic	mean	4.15	4.05	4.05	0.326	0.722
	SD	1.680	1.720	1.750	(df = 2,814)	
Non-attendance at lectures	mean	5.73	5.76	5.81	0.206	0.814
	SD	1.450	1.460	1.400	(df = 2,813)	
Hours	mean	12.03	12.52	17.99	33.506	<0.001
	SD	6.570	8.720	10.560	(df = 2,760)	**

* significant at the 0.05 level, ** significant at the 0.01 level

Table 2.26 indicates that only the variables "Hope", "Pathways" and the number of hours spent in independent study reached significance at the 0.05 level, when a one way ANOVA was applied to the data. There were no significant differences for the variables: "Agency", intrinsic and extrinsic motivation and non-attendance at lectures. There were significant differences between the three years in terms of "Hope" scores, $F(2,799) = 3.478$, $p = 0.031$*. Tukey's HSD revealed that this difference was between years one and two (0.025*). The means indicate that "Hope" decreases after year one and it rises in year three, but although "Hope" increases it does not reach the level it was in the first year. If "Hope" is broken down into its components of "Agency" and "Pathways", it is clear from the table above, that the variable "Agency" did not reach significance when a one way ANOVA was applied to the data. However, looking at the mean scores, it can be seen that "Agency" decreases over the degree course, whereas the variation in scores increases over the degree course. There were significant differences between the three years in "Pathways" scores, $F(2,804) = 3.322$, $p = 0.037$*. Tukey's HSD revealed that the significant difference was between years one and two (0.028*). The mean scores follow the same pattern as the "Hope" scores, in that there was a drop in "Pathways" thought in second year, which rose again in the third year. The standard deviations for

"Pathways" were found to increase through the degree course. The number of hours that students spent studying each week was also significant, $F(2,760) = 33.506$, $p < 0.001$**. Tukey's HSD revealed that these differences were between years one and three (<0.001**) and years two and three (<0.001**). The means show that there was a drastic increase in the amount of time spent studying in the third year, but only a slight increase from first to second year.

To investigate whether there were any differences between years in terms of when students began studying for both coursework and exams a Kruskal Wallis test was applied to the data. The move to non-parametric analysis for these questions was because the intervals between each of the response options were not equal (1 = as soon as the work is set, 2 = a month before, 3 = a fortnight before, etc). Therefore, the conditions of a parametric test were not met and a non-parametric alternative was required. Although the data is of ordinal scale, in this case the median was not a useful measure of central tendency. The mean ranks for each year are given as a more descriptive alternative in Table 2.27.

Table 2.27: The mean rank, range, H and p values after performing a Kruskal-Wallis test.

Variable		Year 1	Year 2	Year 3	H	p
Begin exam	mean rank	365.26	418.14	358.52	11.681 (df = 2)	0.003**
Begin coursework	mean rank	394.57	402.41	348.40	7.867 (df = 2)	0.020*

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

Although there was a significant difference between years, with regard to when students begin studying for exams, $H(2) = 11.681$, $p = 0.003$** , the median was the same for each year (median = 3). Post hoc analysis using Mann-Whitney U tests revealed this difference to be between years one and two (0.004**), and between years two and three (0.002**). The mean ranks clearly show that in second year, students are starting their exam revision later than first or third years. A Kruskal-Wallis test showed that there were significant differences between years, in terms of when students begin studying for

coursework, H(2) = 7.867, p = 0.020*. Post hoc analyses using Mann-Whitney U tests revealed that these differences are between years one and three (0.023*), and years two and three (0.006**). Once again the medians were not particularly descriptive. Years one and three had a median of two, whereas in year two, the mean was three. The mean ranks show that students start studying for coursework slightly later in second year than first year, however, in third year students start much earlier than the previous two years. For both measures, the range for each year was five with the exception of year three in "begin coursework", which was four.

Analysis by student status

This variable investigated whether there were differences in terms of whether the participant is a traditional student, "year out" or mature student. As with the Year of Study analysis, the study skill types were broken down, as were the motivation variables. Table 2.28 details the mean, standard deviation and results from a one-way ANOVA investigating differences between years in the frequency of use of study skill types.

Table 2.28: The means, standard deviations, F and p values after performing a one-way analysis of variance on study skills, by status

Variable		Traditional	Year out	Mature	F	p
Deep exam	mean	3.66	3.70	3.60	0.258	0.773
	SD	1.006	0.959	1.195	(df = 2,746)	
Deep coursework	mean	3.51	3.60	3.52	0.393	0.675
	SD	0.955	0.902	1.096	(df = 2,746)	
Surface exam	mean	3.52	3.54	3.41	0.564	0.569
	SD	1.006	1.066	1.165	(df = 2,759)	
Surface coursework	mean	3.22	3.27	3.22	0.162	0.851
	SD	0.973	0.907	1.207	(df = 2,768)	
Strategic exam	mean	3.66	3.68	3.90	2.806	0.061
	SD	0.962	0.997	1.041	(df = 2,759)	
Strategic coursework	mean	3.80	3.90	3.96	1.344	0.261
	SD	1.063	1.080	1.242	(df = 2,769)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

As can be seen from the Table 2.28, there were no significant differences between students of differing status, in terms of their frequency of use of particular study skill types, when a one-way ANOVA was applied to the data. The motivation variables were then analysed and the means, standard deviations and results from a one-way ANOVA may be found in Table 2.29.

Table 2.29: The means, standard deviations, F and p values after performing a one-way analysis of variance on motivational variables, by status

Motivation variable		Traditional	Year out	Mature	F	p
Agency	mean	5.56	5.57	5.75	2.467	0.085
	SD	0.824	0.821	0.947	(df = 2,797)	
Pathways	mean	5.04	5.12	5.23	2.016	0.134
	SD	0.935	0.748	1.021	(df = 2,795)	
Hope	mean	5.30	5.33	5.51	3.097	0.046*
	SD	0.812	0.681	0.876	(df = 2,790)	
Intrinsic	mean	5.59	5.55	5.97	3.804	0.023*
	SD	1.370	1.410	1.440	(df = 2,800)	
Extrinsic	mean	4.22	4.14	3.50	9.055	<0.001
	SD	1.640	1.790	1.790	(df = 2,805)	**
Non-attendance at lectures	mean	5.75	5.75	5.82	0.102	0.903
	SD	1.430	1.450	1.470	(df = 2,804)	
Hours	mean	13.09	12.98	17.00	9.770	<0.001
	SD	8.120	7.320	11.640	(df = 2,752)	**

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

There were no significant differences between the three groups in terms of "Agency" or "Pathways" scores. However, from Table 2.29, it can be seen that there is relatively little difference between "year out" and traditional students on "Agency", but mature students score higher than both groups. Pathways scores show the same trend. Despite its components not reaching significance, there was a significant difference between the three groups, in terms of "Hope", which is a combination of the two scores, $F(2,790) = 3.097$, $p = 0.046$*. Tukey's HSD revealed that this difference was between traditional and mature students (0.034*). The means show that mature students scored higher on "Hope" than traditional students. There were significant differences between the three groups in terms of "Intrinsic Motivation", $F(2,800) = 3.804$, $p = 0.023$*. Tukey's HSD

showed these differences to be between traditional and mature students (0.023*) and year out students and mature students (0.046*). The means show that mature students score highest on "Intrinsic Motivation" and traditional students score slightly higher than "year out" students. There were significant differences between the three groups in terms of "Extrinsic Motivation", $F(2,805) = 9.055$, $p < 0.001$**. Tukey's showed the differences to be between traditional students and mature students (<0.001**) and year out students and mature students (0.008**). The means show that traditional students score highest on "Extrinsic Motivation", and mature students score the lowest. There were no significant differences between the three groups in terms of missing lectures but there were, however, significant differences between the three groups in terms of the number of hours of independent study done each week, $F(2,752) = 9.770$, $p < 0.001$**. Tukey's HSD showed the difference to be between traditional students and mature students (<0.001**) and year out students and mature students (0.001**). The means show that mature students spend the longest in independent study, but "year out" students spend the least amount of time in independent study.

To investigate whether there were any differences between the three types of student status, in terms of how early they begin studying for both coursework and exams, a Kruskal-Wallis test was applied to the data. Although, the data is of ordinal scale, in this case the median was not a useful measure of central tendency. The mean ranks for each year are given as a more descriptive alternative in Table 2.30.

Table 2.30: The mean rank, range, H and p values after performing a Kruskal-Wallis test.

Variable		Traditional	Year out	Mature	H	p
Begin exam	mean rank	384.04	376.00	336.77	4.651 (df = 2)	0.098
Begin coursework	mean rank	405.08	348.72	301.91	25.023 (df = 2)	<0.001 **

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

Table 2.30 shows that there was no significant difference between the three groups, with regard to how early students begin studying for exams. However, a Kruskal-Wallis test

showed that there were significant differences between the three status groups, in terms of when students begin studying for coursework, $H(2) = 25.023$, $p < 0.001$**. The mean ranks clearly show that mature students begin study for coursework the earliest, followed by "year out" students, and traditional students start working on coursework the latest. The median was three for traditional students and two for "year out" and mature students. Post hoc analysis using Mann-Whitney U tests revealed the significant difference to be between all groups: traditional and "year out" students (0.011*), traditional and mature students (<0.001**) and between "year out" and mature students (0.036*). The range for both variables was five for traditional students, and four for "year out" and mature students.

By Main Subject of Study

This variable investigated whether there were differences in the frequency of use of study skill types and motivation, in terms of the participants' main subject of study. This was split in three ways: there was a distinction between Arts and Science students, the second analysis tested for differences for the 5 subjects with sufficient participant numbers (English, Biology, Geography, Psychology and P.E. and Sports Science), and there was also a comparison to examine whether Psychology students differed from all other students as a group. This section of results will show each of these three breakdowns by use of study skill types and this will then be followed by an analysis of the motivation variables. The following tables show how the subjects compare in terms of frequency of use of study skill types. Arts and Science will be compared (in Table 2.31), followed by a breakdown of the five subjects and finally there will be a comparison of Psychology students with other students.

Table 2.31: The means, standard deviations, t and p values of study skills variables when comparing Arts and Science students

Variable		Arts	Science	t	p
Deep exam	mean	3.68	3.66	-0.255	0.799
	SD	1.090	0.972	(df = 729)	
Deep coursework	mean	3.59	3.50	-1.204	0.229
	SD	0.981	0.951	(df = 726)	
Surface exam	mean	3.22	3.66	5.447	< 0.001
	SD	1.115	0.962	(df = 485)	**
Surface coursework	mean	3.06	3.32	3.557	< 0.001
	SD	1.040	0.965	(df = 745)	**
Strategic exam	mean	3.39	3.86	6.269	< 0.001
	SD	1.063	0.896	(df = 500)	**
Strategic coursework	mean	3.71	3.89	2.196	0.029*
	SD	1.194	1.049	(df = 525)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

To investigate whether there were any differences between Arts and Science students, an independent t-test was applied to the data. All of the types of study skills were found to be significant with the exception of "Deep" study skills when studying for both exam and coursework. As can be seen from the Table 2.31, there was a significant difference between the two groups, in terms of their frequency of use of "Surface" study skills when studying for exams, $t(485) = 5.447$, $p < 0.001$**. The means indicate that Science students use "Surface" study skills the more frequently when studying for exams than Arts students. There was a significant difference between Arts and Science students, in terms of their frequency of use of "Surface" study skills when studying for coursework, $t(745) = 3.557$, $p < 0.001$**. The means indicate that Science students use the skills more than Arts students. There was a significant difference between the two groups, in terms of frequency of use of "Strategic" study skills when studying for exams, $t(500) = 6.269$, $p < 0.001$**. The means indicate that Science students use "Strategic" study skills more frequently when studying for exams than Arts students. There was also a significant difference between Arts and Science students, with regard to frequency of use of "Strategic" study skills when studying for coursework, $t(525) = 2.196$, $p = 0.029$*. Once

again the means indicate that Science students use the skill more frequently than Arts students. An analysis of the five individual subjects will follow and the results from a one-way ANOVA may be found in Table 2.32.

Table 2.32: The means, standard deviations, F and p values of study skill variables according to the students' main subject of study

Variable		English	Biology	Geography	Psychology	P.E and S.S	F	p
Deep (exam)	mean	3.94	3.58	3.66	3.89	3.65	3.165 (df = 4,524)	0.014*
	SD	0.891	0.935	0.943	0.972	0.942		
Deep (coursework)	mean	3.77	3.37	3.66	3.66	3.54	2.813 (df = 4,518)	0.025*
	SD	0.886	0.925	0.908	0.943	0.954		
Surface (exam)	mean	3.26	3.57	3.62	3.92	3.66	7.256 (df = 4,533)	< 0.001 **
	SD	1.013	0.982	0.974	0.889	0.955		
Surface (coursework)	mean	3.18	3.32	3.49	3.37	3.36	1.343 (df = 4,541)	0.253
	SD	0.951	0.946	0.883	1.014	0.965		
Strategic (exam)	mean	3.42	3.98	4.04	3.98	3.67	9.240 (df = 4,530)	< 0.001 **
	SD	1.021	0.895	0.846	0.865	0.911		
Strategic (coursework)	mean	3.80	3.91	4.23	4.10	3.67	4.725 (df = 4,537)	0.001**
	SD	1.175	0.956	1.022	0.970	1.061		

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

To investigate whether there were any differences between the five subjects of study listed in the table above a one-way ANOVA was applied to the data. All of the types of study skills were found to be significant with the exception of "Surface" study skills when studying for coursework. As can be seen from the table above, there were significant differences between the five subjects, in terms of their frequency of use of "Deep" study skills when studying for exams, $F(4,524) = 3.165$, $p = 0.014$*. Tukey's HSD revealed that this difference was between English and Biology students (0.042*) and looking at the means, it can be seen that English students use "Deep" study skills the most frequently out of the five subjects, when studying for exams, whereas Biology students use them least frequently. There were significant differences between the subjects, in terms of frequency of use of "Deep" study skills when studying for coursework, $F(4,518) = 2.813$, $p = 0.025$*. Tukey's HSD showed this difference to be

between English and Biology (0.013*) and once again, the means showed that English students use "Deep" study skills the most frequently when studying for coursework and Biology students use them the least frequently out of the five subjects. There were significant differences between the five subjects, in terms of frequency of use of "Surface" study skills when studying for exams, $F(4,533) = 7.256$, $p < 0.001$**. Tukey's HSD showed this difference to be between English and Psychology (<0.001**) and English and P.E. and Sports Science (0.013*). The means indicate that English students use "Surface" study skills the least frequently out of the five subjects, when studying for exams and Psychology students use them the most frequently, followed by P.E. and Sports Science students. There were significant differences between the subjects, in terms of frequency of use of "Strategic" study skills when studying for exams, $F(4,530) = 9.240$, $p < 0.001$**. Tukey's HSD revealed this difference to be between English and Biology (<0.001**), English and Geography (<0.001**) and English and Psychology (<0.001**). The means indicate that English students use "Strategic" study skills the least frequently out of the five subjects, when studying for exams, whereas Geography students use them the most frequently, followed by Biology and Psychology, which are used to an equal extent. There was a significant difference between the subjects with regard to frequency of use of "Strategic" study skills when studying for coursework, $F(4,537) = 4.725$, $p = 0.001$**. Tukey's HSD revealed this difference to be between English and Geography (0.043*), Geography and P.E. and Sports Science (0.003**), and Psychology and P.E. and Sports Science (0.009**). The means indicate that P.E. and Sports Science students used the skills the least frequently out of the five subjects, followed by English, Biology and Psychology. Geography students used the skills most frequently. An analysis was then carried to examine whether Psychology students differ significantly from other students. The results from an independent t-test may be found in Table 2.33.

Table 2.33: The means, standard deviations, t and p values of study skill variables when comparing Psychology with other students

Variable		Psychology	Other	t	p
Deep exam	mean	3.89	3.62	2.824	0.005**
	SD	0.969	1.017	(df = 736)	
Deep coursework	mean	3.66	3.51	1.647	0.100
	SD	0.941	0.966	(df = 733)	
Surface exam	mean	3.92	3.42	5.724	< 0.001
	SD	0.892	1.047	(df = 213)	**
Surface coursework	mean	3.38	3.20	1.939	0.053
	SD	1.022	0.992	(df = 752)	
Strategic exam	mean	3.99	3.63	3.815	< 0.001
	SD	0.862	0.999	(df = 748)	**
Strategic coursework	mean	4.10	3.77	3.193	0.001**
	SD	0.968	1.125	(df = 757)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

To investigate whether there were any differences between Psychology and other students, an independent t-test was applied to the data. There was a significant difference between Psychology students and other students, in terms of their of use of "Deep" study skills when studying for exams, $t(736) = 2.824$, $p = 0.005$**. The means show that Psychology students use "Deep" study skills when studying for exams, more frequently than other students. However, there was no significant difference between the two groups, in terms of their of use of "Deep" study skills when studying for coursework. There was a significant difference between the two groups in terms of the frequency of use of "Surface" study skills when studying for exams, $t(213) = 5.724$, $p < 0.001$**. The means indicate that Psychology students use "Surface" study skills more frequently, when studying for exams, than other students. There was, however, no significant difference between the two groups, in terms of their frequency of use of "Surface" study skills when studying for coursework. There was a significant difference between the two groups, in terms of the frequency of use of "Strategic" study skills when studying for exams, $t(748) = 3.815$, $p < 0.001$**. The means indicate that Psychology students use "Strategic" study skills more frequently when studying for exams than other students. There was also a significant difference between the two groups, with regard to frequency

of use of "Strategic" study skills when studying for coursework, t(757) = 3.193, p = 0.001**. Once again the means indicate that Psychology students use the skill more frequently than other students. The motivation variables were then analysed and the means, standard deviations and results from an independent t-test, comparing Arts and Science students may be found in Table 3.34.

Table 3.34: The means, standard deviations, t and p values of motivational variables comparing Arts and Science students

Motivation variable		Arts	Science	t	P
Agency	mean	5.58	5.59	0.075	0.941
	SD	0.864	0.841	(df = 775)	
Pathways	mean	5.03	5.10	1.046	0.296
	SD	0.949	0.898	(df = 772)	
Hope	mean	5.31	5.34	0.478	0.633
	SD	0.813	0.796	(df = 768)	
Intrinsic	mean	5.55	5.69	1.358	0.175
	SD	1.450	1.370	(df = 777)	
Extrinsic	mean	4.09	4.12	0.202	0.840
	SD	1.670	1.730	(df = 782)	
Missed	mean	5.82	5.73	-0.835	0.404
lectures	SD	1.400	1.470	(df = 782)	
Hours	mean	15.33	12.81	-3.484	0.001**
	SD	10.190	7.770	(df = 736)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

Analyses were conducted using independent t-tests to determine whether Arts students differ from Science students, in terms of motivation. There was no significant difference between the two groups, in terms of "Agency", "Pathways", "Hope", "Intrinsic Motivation", "Extrinsic Motivation", and in terms of non-attendance at lectures. There were, however, significant differences between the groups, in terms of the number of hours spent in independent study each week, t(430) = -3.484, p = 0.001**. The means showed that Arts students spend longer in independent study each week than Science students. A comparison between the five individual subjects will follow, to examine the motivation variables. This can be found in Table 3.35.

Table 3.35: The means, standard deviations, F and p values of motivational variables according to the students' main subject of study

Motivation variable		English	Biology	Geography	Psychology	P.E and S.S	F	p
Agency	mean	5.75	5.65	5.52	5.71	5.56	1.526	0.193
	SD	0.809	0.882	0.662	0.719	0.909	(df = 4,588)	
Pathways	mean	5.11	5.14	5.03	5.16	5.19	0.440	0.779
	SD	0.875	0.949	0.752	0.848	0.980	(df = 4,556)	
Hope	mean	5.44	5.39	5.27	5.43	5.38	0.645	0.630
	SD	0.773	0.841	0.614	0.726	0.879	(df = 4,553)	
Intrinsic	mean	5.70	5.72	5.72	5.73	5.81	0.111	0.979
	SD	1.380	1.580	1.190	1.320	1.300	(df = 4,559)	
Extrinsic	mean	4.08	4.17	4.17	4.11	4.15	0.065	0.992
	SD	1.750	1.700	1.680	1.660	1.790	(df = 4,563)	
Missed	mean	6.02	5.64	5.91	5.79	5.76	1.320	0.261
lectures	SD	1.210	1.47	1.27	1.320	1.480	(df = 4,563)	
Hours	mean	14.31	10.27	13.47	15.26	12.16	6.808	< 0.001
	SD	8.030	5.300	9.010	8.840	6.890	(df = 4,528)	**

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

There were no significant differences between the five subjects, in terms of "Agency", "Pathways", "Hope", "Intrinsic Motivation", "Extrinsic Motivation" and in terms of non-attendance at lectures. There were, however, significant differences between the five subjects, in terms of the number of hours of independent study done each week, $F(4,528) = 6.808$, $p < 0.001$**. Tukey's HSD showed the difference to be between English and Biology (0.001**), Biology and Psychology (<0.001**), and between Psychology and P.E. and Sports Science (0.015*). Table 3.35 shows that Psychology students had the highest mean number of hours spent studying, followed by English, Geography and P.E.. Biology students spent the least amount of time each week on independent study. An analysis was then conducted to examine whether Psychology students significantly differ from other students in terms of motivation. The results from an independent t-test may be found in Table 3.36.

Table 3.36: The means, standard deviations, t and p values of motivational variables comparing Psychology students with other students

Motivation variable		Psychology	Other	t	p
Agency	mean	5.71	5.56	2.142	0.033*
	SD	0.719	0.872	(df = 225)	
Pathways	mean	5.16	5.06	1.087	0.277
	SD	0.848	0.931	(df = 772)	
Hope	mean	5.43	5.31	1.601	0.110
	SD	0.726	0.816	(df = 768)	
Intrinsic	mean	5.73	5.62	0.778	0.437
	SD	1.320	1.420	(df = 777)	
Extrinsic	mean	4.11	4.11	0.030	0.976
	SD	1.660	1.720	(df = 782)	
Missed lectures	mean	5.79	5.76	0.187	0.852
	SD	1.320	1.470	(df = 782)	
Hours	mean	15.26	13.38	2.210	0.027*
	SD	8.840	8.750	(df = 730)	

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

Analyses were conducted, using independent t-tests to determine whether Psychology students differ from other students in terms of motivation. There was a significant difference between the two groups, in terms of "Agency", $t(225) = 2.142$, $p = 0.033$*. The means revealed that Psychology students scored higher on "Agency" than other students. There was no significant difference, however, in terms of "Pathways", "Hope", "Intrinsic Motivation", "Extrinsic Motivation" or in terms of non-attendance at lectures. There were, however, significant differences between the groups, in terms of the number of hours of independent study done each week, $t(730) = 2.210$, $p = 0.027$*. The means showed that Psychology students spend longer on independent study than other students.

To investigate whether there were any differences between Arts and Science students, in terms of how early they begin studying for both coursework and exams, Mann-Whitney U tests were applied to the data. The mean ranks for each year are given as a descriptive statistic in Table 3.37.

Table 3.37: The mean rank, U and p values after performing a Mann-Whitney U test

Variable		Arts	Science	U	p
Begin exam	mean rank	404.63	349.58	53498.50	< 0.001 **
Begin coursework	mean rank	402.36	358.58	57158.00	0.006**

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

Table 3.37 shows that there was a significant difference between the two groups with regard to how early students begin studying for exams, U = 53498.50, p < 0.001**. The mean ranks indicate that Science students begin revision earlier than Arts students. There was a significant difference between the two groups, with regard to how early students begin studying for coursework, U = 57158.00, p = 0.006**. The mean ranks indicate that Science students begin coursework earlier than Arts students. To investigate whether there were any differences between the five subjects of study, in terms of how early they begin studying for both coursework and exams, a Kruskal-Wallis test was applied to the data. The mean ranks for each year are given as a descriptive statistic in Table 3.38.

Table 3.38: The mean rank, H and p values after performing a Kruskal-Wallis test.

Variable	English	Biology	Geography	Psychology	P.E and S.S	H	p
Begin exam study mean rank	319.76	271.37	290.56	195.36	277.10	50.012	< 0.001 **
Begin coursework mean rank	324.58	214.95	232.22	255.92	298.77	39.164	< 0.001 **

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

Table 3.38 shows that there was a significant difference between the five subjects, with regard to how early students begin studying for exams, H(4) = 50.012, p <0.001**. Post hoc analysis using Mann-Whitney U tests, revealed the significant differences to be between English and Biology (0.011*), English and Psychology (<0.001*), Biology and Psychology (<0.001**), Geography and Psychology (<0.001**), and Psychology and P.E. and Sports Science students (<0.001**). The mean ranks show that Psychology

students begin study for exams the earliest, followed by Biology, P.E. and Sports Science, Geography students, and English students start exam revision the latest. There was a significant difference between the five subjects, with regard to how early students begin studying for coursework, $H(4) = 39.164$, $p < 0.001$**. Post hoc analysis using Mann-Whitney U tests revealed the significant differences to be between English and Biology (<0.001*), English and Geography (<0.001**), English and Psychology (<0.001**), Biology and Psychology (0.039*), Biology and P.E. and Sports Science students (<0.001**), Geography and P.E. and Sports Science (0.004**), and Psychology and P.E. and Sports Science students (0.028*). The mean ranks show that Biology students begin study for coursework the earliest, followed by Geography, Psychology, P.E. and Sports Science, and English students start coursework the latest. To investigate whether there were any differences between Psychology students and other students, in terms of how early they begin studying, for both coursework and exams, a Mann-Whitney U test was applied to the data. The mean ranks for each year are given as a descriptive statistic in Table 3.39.

Table 3.39: the mean rank, U and p values after performing a Mann-Whitney U test

Variable		Psychology	Other	U	p
Begin exam	mean rank	264.83	392.30	26180.00	< 0.001 **
Begin coursework	mean rank	353.92	378.91	37940.00	0.212

* indicates significance at the 0.05 level, ** indicates significance at the 0.01 level

Table 3.39 shows that there was a significant difference between the two groups, with regard to how early students begin studying for exams, $U = 26180.00$, $p < 0.001$**. The mean ranks indicate that Psychology students begin revision earlier than other students. There was, however, no significant difference between the two groups, with regard to how early students begin studying for coursework

2.8 Discussion

The discussion will follow the subsequent pattern. The results from the analysis of the entire sample will be discussed, followed by an analysis according to year of study, student status and main subject of study. There were three analyses carried out on main subject of study: a comparison of Arts and Science distinction, an analysis of five separate subjects and a comparison of Psychology students with students from all of the other disciplines combined as a group. In each analysis study skill use will be examined according to study skill 'types' (i.e. Deep, Surface or Strategic) and the Hope scale will be considered. Intrinsic and Extrinsic motivation will be examined, followed by four measures of commitment: non-attendance at lectures, hours spent in independent study each week, and how early the student began studying for exams and coursework.

When the entire sample was analysed for frequency of use of study skills, the results showed that the high scoring techniques included: the use of the library (for coursework) and a range of skills concerning lectures notes. Results indicated that the most frequent skills were: taking lecture notes, which were later used for study, catching up on any notes missed and keeping notes organised in folders. The least frequently used were mnemonic techniques, mind maps, graphs and wall-charts. The results indicate that both Deep and Surface study skills were used more frequently when studying for exams than coursework. The least frequently used Deep skills were all concerned with coursework study and included: summarising notes, testing oneself and posing questions for oneself. The least frequently used Surface skills were all concerned with coursework and included repetition, verbal rehearsal, rewriting of lecture notes and condensing of notes. This finding that students are not using study skills as frequently for coursework, could suggest that students are not learning the material as well as they might do for exams. There is research to suggest that students are predisposed to learn in a particular way and that, although styles may differ between students, the approaches that individuals use are consistent (Schmeck, 1983; cited in Vermetten, Lodewjks & Vermundt, 1999). To write a good essay, lecturers concur that students must not simply replicate information from books, but that material must be learnt (Marton, Hounsell & Entwistle, 1997). Therefore,

if students' main method of learning is using surface (or alternatively deep) study skills, following Schmeck's (1983: in Vermetten, Lodewjks & Vermundt, 1999) argument students will use these techniques for both exam revision and coursework. Therefore, the result that students are not using study skills as frequently for coursework implies that students are not learning the material for coursework as well as they are doing for exams. This may be because students have to hold the learning material in memory for exams, whereas this is not the case for coursework.

The motivation scores revealed that Agency was higher than Pathways thought, which supports the findings of the pilot study. This suggests that students are being driven towards their goals to a greater extent than they are motivated to overcome obstacles in their way. Intrinsic motivation was found to be higher than extrinsic, which also supported the findings from the pilot study. This suggests that Chester College students seek internal rewards rather than extrinsic ones for their efforts. The average number of hours spent in independent study each week was 14 but the scores on this item were extremely diverse (SD = 9). Results suggested that the majority of students begin studying a fortnight before exams, and a month before coursework is due to be submitted.

Changes across the degree course

Results showed that first year students use Surface study skills (for coursework) more frequently and Strategic study skills (for exams) less frequently than other students. Third year students, however, use Deep study skills more frequently (for exams). There were no significant differences between years in the use of "Surface" study skills when studying for exams, or "Deep" or "Strategic" study skills when studying for coursework, although, the use of "Deep" and "Strategic" study skills did increase through the degree course. Such findings suggest that as the student progresses through the degree course, they develop more sophisticated methods of learning. This supports Harper, Kember and Richardson (1995; cited in Zeegers, 2001), who argued that older students use more elaborate study approaches. There is much research to suggest that "Deep" level learning is superior to "Surface" level learning (Craik and Lockhart, 1972; Craik and Tulving, 1975; Marton and Saljo, 1976). These results did not support the findings of the pilot

study, but it must be pointed out that there were only eight study skills on the initial questionnaire. If differences did exist between years, the current instrument had an increased chance of identification, as it collected information on a wider range of skills.

In terms of motivation, although "Agency" scores were not significant, the means showed a decline across the three years, whereas variation between scores increased. This supported the findings of the pilot study. The results also showed that first year students scored significantly higher than second year students on "Hope" and "Pathways" scores. The means for both variables showed a decrease after year one and an increase after year two, but not to the level reached in year one. These findings support the experimental hypothesis: that there will be a significant change in motivation through the degree course. The findings supported the pilot study in that motivation did change through the degree course. However, the finding from the pilot, that there was a decline from year one to three on Pathways and Hope scores, was not supported by the present study. The current studies' Pathways and Hope results are, however, consistent with those of Jacobs and Newstead (2000), who found that motivation decreased after level one and increased in level three. They argued that students seem to experience 'second year blues'. It could be suggested from these findings that students are entering Higher Education with unrealistic beliefs about their own ability, the workload and their interest or expectations about the course material. The structure of Higher Education is very different from sixth-form college and students are required to manage their own workload and to motivate themselves. In Further Education, although students are given more freedom than school, their work is monitored much more closely. Going to university is often the first time that traditional students have lived away from their parental home and they, therefore have a great deal more freedom in their personal lives, in addition to freedom in their academic lives. This could lead to distraction and a loss of routine studying. In many Higher Education institutions, the grades from first year contribute relatively little or not at all, to the final degree and the second year often counts for a percentage, usually around one-third of the final mark. Many students appear to have the attitude that "first year doesn't count" and may believe that they will work hard when it really matters.

The results showed that in third year, students seem to experience 'exit velocity'. This refers to students' increase in activity and motivation just prior to course completion. Jacobs and Newstead (2000) pointed out that it is encouraging that motivation recovers in the third year. However, the finding that Agency continues to decline throughout the degree course is particularly concerning. This implies that although Pathways thought increases in year three and students find themselves motivated to get past obstacles between themselves and their goals, students' drive to succeed continues to plummet as the degree progresses. There were no significant differences between years in terms of "Intrinsic Motivation", "Extrinsic Motivation", or non-attendance at lectures. However, the numbers of hours spent in independent study each week was significant between years. Third year students spent significantly longer than both first and second year students on independent study each week. The means showed this to be approximately 5 hours longer than the time spent by first and second years. This supports the idea that third year students experience 'exit velocity'. There were significant differences between years in terms of when students begin studying for both exams and coursework. Second year students begin studying significantly later for exams than both first and third year students. This finding corresponds with the decrease in motivation that is evident in second year students. However, third year students begin studying for coursework significantly earlier than both first and second year students. This supports the results of Harper, Kember and Richardson (1995; cited in Zeegers, 2001) who found that older students are more committed to their study.

A comparison by student status

The findings from this study showed that there were no significant differences in terms of student status with regard to the frequency of use of study skill types. This finding suggests that mature students are not going about their study any differently than traditional students. This does not support the results of Biggs (1987), who found that the Surface approach, which includes strategies and motivation, decreases significantly after the age of 18 until the mid-twenties where it stabilises, until after the age of 39 when there is a considerable decline. Biggs also suggests that Deep strategies are more readily

acquired in real life than in the classroom. He suggested that the longer a student is away from the classroom, the more likely they are to adopt deep study techniques and reject reproducing approaches. Also the results do not support Zeegers, Martin and Martin (1999) who found that older students scored higher on deep approaches and lower on surface approaches when conducting a longitudinal study into first year science students.

The findings of this study do, however, support the work of Richardson (1994), who forcibly criticises the stereotype that mature students are lacking in the basic skills essential for student learning. Richardson critically evaluated a body of research evidence concerning the academic performance of mature students finding no significant differences between traditional and mature students (Marshall and Nicolson, 1991; Hartley and Lapping, 1992; Richardson, 1995; cited in Richardson, 1994). His results indicated that mature students performed slightly better than their younger colleagues, although this finding was not significant. The results of the current study, that there are no differences in the frequency of use of study skills types, supports the assertion of Richardson, that based on studies of degree performance, there is no evidence to suggest that mature students are 'out of practice' or deficient in terms of study skills. However, in terms of motivation, the results showed that mature students score significantly higher on "Hope" than traditional students. This supports the findings from the pilot study, which showed that students who have had a break in their education, scored significantly higher on Hope, Agency and Pathways. The hypothesis, that mature students are more motivated than traditional students, is therefore supported. This finding is consistent with Richardson (1994) who argues that older students have greater maturity and show greater motivation. Mature students were found to score significantly higher than other students in terms of "Intrinsic Motivation" but significantly lower than traditional students on "Extrinsic Motivation". The results indicated that in addition to having greater motivation, mature students are more committed to their work in terms of their actions. There were no significant differences in attendance at lectures but there were significant differences in terms of hours spent in independent study. The results showed that mature students do significantly more hours of study than both traditional and year out students.

The greater motivation and commitment of mature students may be explained by a number of reasons. The material and psychological costs of entering Higher Education seem to increase with age (Biggs, 1987). Although in financial terms the cost of fees is the same, mature students often have a great deal more responsibilities than traditional students. This cost can be seen in terms of time away from children and dependents, which may also include child-minding fees. Mature students may also have their employment to consider. They may have to make a decision to leave work to study full-time or alternatively continue working and study part-time. Either way, mature students make a conscious decision to go to university, whereas for many traditional students, university is seen as a logical progression from sixth-form college. The high intrinsic and low extrinsic motivation finding may be also be explained by this argument. Due to this increased cost to their lives, mature individuals returning to education may have chosen to do so to prove themselves in some way, perhaps in terms of intelligence. The student may have decided upon a career change, which requires specific qualifications or they may be seeking skills to help them climb the career ladder. Alternatively they may have a very keen interest in the subject. Mature students may have researched what the degree involves and may have made a more informed choice about their degree, so they may not experience the disillusionment felt by traditional students. Biggs (1987) argues that younger students are more instrumentally or pragmatically motivated and suggests that they may have the 'meal-ticket' mentality". He also points out that it is ironic that mature students feel 'out of touch' with study techniques as their methods are better than students who have continued in education straight from secondary school.

There were no significant difference in terms of when students begin studying for exams but the results showed that all interactions were significant when students begin studying for coursework. Mature students begin studying significantly earlier for coursework than year out students, who in turn, begin studying significantly earlier than traditional students. This supports the finding of Harper, Kember and Richardson (1995; cited in Zeegers, 2001), who suggested that older students are more committed than their younger colleagues. With the exception of this finding there were no other significant differences between traditional and "year out" students. It was thought that if an individual took a

year away from their studies, their time spent in the world of work or perhaps travelling would give them a more mature view of their study, than traditional students.

Main subject of study

There were three separate analyses conducted to investigate whether significant differences existed between the students' main subject studied. The first investigated any differences between Arts and Science, the second was a breakdown of five subjects (English, Biology, Geography, Psychology and P.E. and Sports Science), and the final analysis investigated differences between Psychology students and all other students combined as one group. The results from the first of these analyses showed that although there were no significant differences between Deep study skills, Science students used Surface and Strategic skills significantly more than Arts students. English students used "Deep" study skills significantly more than Biology students, however, English students use "Surface" study skills, when studying for exams, significantly less than Psychology and P.E. and Sports Science students. This result supports Biggs (1987), who found that science students score highest on the surface approach. However, there were no significant differences between individual subjects for frequency of use of "Surface" study skills when studying for coursework. English students were found to use "Strategic" study skills for coursework, less than Biology, Geography and Psychology students. Geography students were found to use "Strategic" study skills more than English and Biology students, and Psychology students use the skills more than P.E. and Sports Science students.

There were no differences in motivation between Arts and Science and the individual subjects, with the exception of hours spent studying. Arts students spent significantly longer than Science students, in independent study each week. Biology students spent significantly less hours in independent study than English and Psychology students. Psychology students also spent significantly longer in independent study than P.E. and Sports Science. Arts students were found to begin studying significantly earlier than Science for both exam and coursework. A separate analysis showed that Psychology

students used "Deep" and "Surface" study skills more frequently when studying for exams than other students as a group, but there were no significant differences when studying for coursework. Psychology students also use "Strategic" study skills more than other students. They were found to be more motivated in terms of "Agency" but the other motivation levels were not found to be significant. In terms of commitment, Psychology students studied an average of 15 hours per week compared with other students who averaged 13 hours per week and Psychology students began studying for exams significantly earlier than other students. The difference in study skill types could be explained by a number of reasons. Firstly the researchers are psychologists and may have based the questionnaire on skills, which are specific to the Psychology discipline or the type of learners it attracts. Psychology students spend a considerable amount of time studying the concept and process of learning and human memory which one would expect would give them an insight into studying which other students may not necessarily have. With regard to the motivation findings, as the researcher works in the department, Psychology students may have felt more pressure than other students to rate their motivation and commitment higher. The implications of these findings are that researcher should take care when investigating student learning using Psychology students as they may be different to the remainder of student population. Psychologists often investigate student learning and use Psychology students as their participants as they are a convenient resource.

There was no response rate measured in either study one or two and opportunity sampling was used to recruit participants. In study one, participants were accessed around the College grounds and particularly around the library, whereas in study two a more structured approach was used. Questionnaires were distributed at a lecture for each year of each subject and anecdotally it can be reported that the majority of the students completed the questionnaires. In study one, students were asked if they would take a few minutes to complete a questionnaire and although there was no formal measure taken, there were a greater number of refusals. It could be argued that the students who did not agree to complete the questionnaire are different to the students who did complete it, therefore suggesting an unrepresentative sample. However, it can be argued that in study

two, the sample was representative of the population due to the large sample size with sizeable numbers from each year of academic study. There was a wide range of ages and a large variety of subjects studied. Further study into this area should calculate a response rate of participants completing the questionnaire. This would ensure a representative sample.

Conclusion

Analysis of the entire sample revealed that students use study skills more frequently when they are studying for exams than coursework. This may suggest that students are not learning the material for coursework, as well as they do for exams. Lecturers may wish to spend some time recommending appropriate methods of studying for coursework and it is clear that this area deserves further research into exactly how the learning differs. The study revealed a significant decrease in motivation in the second year of study, which is consistent with the literature (Jacobs and Newstead, 2000). This finding has implications for how degree marks are weighted between the three years. Jacobs and Newstead (2000) point out that this may impact courses which have an equal weighting of second and third year, as students may not perform as well in second year, due to their lack of motivation. The differences found between the Agency and Pathways components of the motivation scale, suggest that motivation cannot simply be measured on a single scale and that other factors need to be considered. This may be another area for future research. Jacobs and Newstead (2000) argue that many measures of motivation are too crude to pick up subject specific differences that exist between students. The study is also a cross-sectional design and, if Zeegers (2001) is correct in saying that approaches to learning are dynamic, taking a snapshot of one point in time from each year, may not be sufficient to understand how study skill use and motivation change throughout the degree course. The findings that Psychology students differ from others in their learning strategies and motivation, is something which psychologists should bear in mind when selecting their research participants. Psychology students are often used in experiments, as they are a convenient 'resource'. This is not to suggest that they should

not be used as research participants but this study does highlight some of the ways in which they differ from other students.

Perhaps the most important finding from this study is that mature students are significantly more motivated than other students and are prepared to invest much more in their studies, in terms of time and effort. It would be of great benefit for these students, and indeed highly motivated traditional students, to find a technique, which could improve their learning and help to achieve their potential. Research indicates that the mind map technique could be a possible candidate. Farrand, Hussain & Hennessay (2002) found that the mind map technique could be beneficial provided students are highly motivated and they produce high quality mind maps. However, the pilot questionnaire showed that use of charts and diagrams was one of the least frequently used study skills. The current study also revealed that when the skills used in the mind mapping process were combined into a 'mind map relevant' score, they were not used frequently when compared with other skills. This indicates that many mature students may not have tried this study skill. Before any making any recommendations, this study will continue to investigate the efficacy of this technique.

Chapter 3 - The efficacy of the Mind Map technique

3.1: Study 3 - A preliminary investigation into the Mind Map technique

Study 2 identified differences between groups of students, in terms of the study skills used and motivation. In particular, the study identified that mature students are significantly more motivated than traditional students yet mature students are using the same techniques and study skills as their less motivated peers. This suggests that despite an increased determination to succeed, mature students are not doing anything different, in terms of how they study. One might assume that if this group of highly motivated students were trained to use the most effective study skills, the students would display better academic performance. It was decided that it would be of benefit to investigate the efficacy of a study technique. There have been thousands of 'How To' study guides written, advising students on the 'best' methods of note-taking and revision, however there has been limited scientific investigation into their effectiveness. So, after reviewing the literature and the results of the study skills questionnaire, the mind map technique was selected.

The main hypothesis of this study is that mind mapping will be a favourable technique when compared with students' normal methods of study. However, following the findings of Farrand, Hussain & Hennessay (2002) it is predicted that mind mapping will only be a favourable technique when the student is highly motivated and the mind map produced is of high quality. This hypothesis may be explained in terms of the findings of Baddeley and Hitch (1974). They proposed a model of Working Memory, in which the short-term memory system is made up of at least three components: the central executive, the phonological loop and the visuo-spatial sketch pad. As mentioned in the literature, the central executive acts as a governing system similar to attention, the phonological loop processes verbal material and the visuo-spatial sketch pad processes visual and spatial information. It may be inferred from this model that mind mapping would be an effective technique, as it involves verbal, visual and spatial processing. The verbal

processing comes from the reading of text and selection of key information to be put into the map. The visual processing would be involved when imagery and colour are used in the mind map to represent concepts and links between them and mind maps are spatially organised. This means that if a person can recall the position of a concept on the map, they should be able to recall the linking concepts. By using both slave systems of working memory the information should be coded in not only a visual, but also spatial and verbal form, which one could argue should increase recall.

Paivio (1986; cited in Eysenck and Keane, 1998) proposed dual code theory, which identifies two interlinked but separate systems for the processing of information. There is a verbal system and a visual system and in a similar way to Working Memory, it can be assumed that when using the mind mapping technique, information is coded in two different ways, which should increase the chances of recall. Paivio and Caspo (1969; cited in Eysenck and Keane, 1998) also discovered that words are more likely to be recalled if an image is created and the mind mapping technique emphasizes the use of imagery wherever possible.

The hypothesis is also based on the findings of Miller (1956). He found that the capacity of short-term memory is seven items plus or minus two. The structure of a mind map involves a number of branches (usually between 4 to 10), which hold the key topics of the information to be learnt. Miller found that the capacity of short-term memory can be extended if information is 'chunked'. Following this argument if the information on a topic can be reduced to meaningful and relevant keywords and attached to a main topic (i.e. a branch), then the branches in a mind map can act as the limited number of chunks, which are the capacity of short-term memory. This means that when a student enters an exam, if they have learnt the information then they can produce of mind map easily recalling the main branches. Each chunk could represent a schema and as Chase and Simon (1973) found these chunks can hold more information when practised.

According to Craik and Lockhart (1972), the deeper the processing of the information, the more likely it is to be recalled. As can be seen from the findings of the Study Skill

Questionnaire, surface study techniques tend to be employed frequently by students and there seems to be some kind of understanding that the more a piece of information is read or written out, then the more likely it is that some form of osmosis will transfer the information into memory. Craik and Lockhart found this not to be the case. The mind map technique involves a deep level of processing, as the process involves - thorough understanding of the text. This is in order to identify key themes in the text, which require hierarchical organisation and an understanding of relations between these key concepts.

3.2: Method

Design

A within subjects design was used in the experiment. The independent variable was test phase, which had two levels: the pre-test condition required participant to use the study techniques they normally use, and the post-test condition required participants to use the Mind Map Technique after instruction on its use. The dependent variable was the score achieved on a task. There were two texts used in the experiment and these were piloted to reduce the chance of inequality of task. The tasks were also counterbalanced.

Participants

There were 18 participants in the study, although only 17 participants completed the Study Skill Questionnaire so demographic information was not available for one of the students. The participants were all undergraduates at Chester College of Higher Education in North West England. There were 8 first year students and 9 second year students and also there was an uneven gender balance, in that there were a greater number of females. The age range was approximately 19 to 41, and there were 6 mature students and 1 student who had taken a year out. Participants were all recruited using the front page of the Study Skill Questionnaire (which offered a tick-box if interested in further study) and also opportunity sampling. A consent form was used to ensure the participants knew their rights, and they were all treated according to BPS guidelines

Materials

A consent form was used in the experiment (see Appendix 11), as was the Study Skill Questionnaire from Study 2 (see Appendix 7). A full description of the Study Skill Questionnaire may be found in the previous chapter.

There were 2 texts used in the experiment and general topics were chosen to avoid bias towards any particular subject. The topics were Crime and Feminism, and the questions for the task, were devised by the experimenter. Question sheets included 12 questions per text and took the form of either short answer or multiple choice. The questions on each text were also matched as closely as possible for depth, in terms of whether a deep or surface approach would be required to learn the information to answer the question. A text was also used for practicing the mind map technique and was on the topic of the life of Queen Victoria. Copies of these texts, questions, answers and answer sheets may be found in appendices 12, 13, 14 and 15 respectively. Additional materials required were 4 pens per participant (red, green, blue and black), A3 paper, an overhead projector and acetates including instructions for the study (pre-test and post-test, copies of the instructions may be found in appendix 16). Acetates of the mind map presentation were also required and copies of some of these may be found in appendix 17. Both Microsoft Excel and SPSS, versions 10 and 11 were used to analyse the results.

Procedure

Prior to the experiment the tasks to be used in the experiment were piloted by 12 participants. They were asked to read through the text and learn it using the study techniques that they normally use. After 20 minutes, the participants were given a set of questions to answer to the best of their ability. Results indicated that on both tasks most scores were between 50-60% correct, which suggested that the tasks were of equal difficulty. The questions on the tasks were also matched for question type (short answer, or multiple choice) and depth (in terms of whether a deep or surface approach was required to learn the information required to answer the question). Participants were seated and asked to complete a consent form and a Study Skill Questionnaire and after completion, several sheets of A3 paper and pens were distributed to participants. Participants were informed that before the study skills training began, a task was to be completed. Instructions were put on acetate on an overhead projector, which instructed participants to read the passage of text that they were presented with, and to learn it using

the study techniques they normally use. They were given 20 minutes to complete this task. The text and any notes made by the participants were collected and the participants were then presented with a set of 12 questions and an answer sheet. They were given 5 minutes to answer as many questions as possible and then question and answer sheets were collected. Participants were subsequently given a presentation on Mind Mapping.

The participants were taught that when constructing a mind map, the first stage is to create a central word or image on the page, which represents the main topic of study. The first major branch should then be added and this will contain a keyword to represent the main topic subheadings. The participants were instructed that the first branch should always be placed at the top right hand corner of the page. Detail should be added onto this first branch (in the form of keywords or images) and further detail can be added on increasingly smaller branches. The next step is to complete the other main branches in the same manner. The participants were also taught a series of mind map laws and principles. These include always using A3 paper in a landscape view, using colour and images wherever possible and structuring the mind map with main topics and themes in the centre of the page with increasing detail towards the edge of the page. Only one keyword should be clearly printed on each branch and the mind map should be constructed in such a way that it can be read without turning the page around.

The participants were shown examples of mind maps and taught how to read the mind maps. They should be read in the same order they are constructed: starting with the top right hand corner and reading branches of increasing detail. The branches should be read in a clockwise direction. An example was also given of how to construct a mind map from a piece of text. The experimenter explained that the text should be read thoroughly ensuring it is fully understood. The main themes from the text were turned into branches and detail about these themes was added onto smaller branches. The participants were given the opportunity to construct their own mind map, in pairs or small groups with guidance from the experimenter. For more details of the mind map presentation, please refer to Appendix 17.

In the post-test phase, the participants were given the other text. Instructions were again put on the overhead projector directing participant to learn the piece of text using the mind map technique as they had just been taught. After 20 minutes texts and mind maps were collected and question and response sheets were given out. After 5 minutes questions and answers were collected and participants were thanked and debriefed.

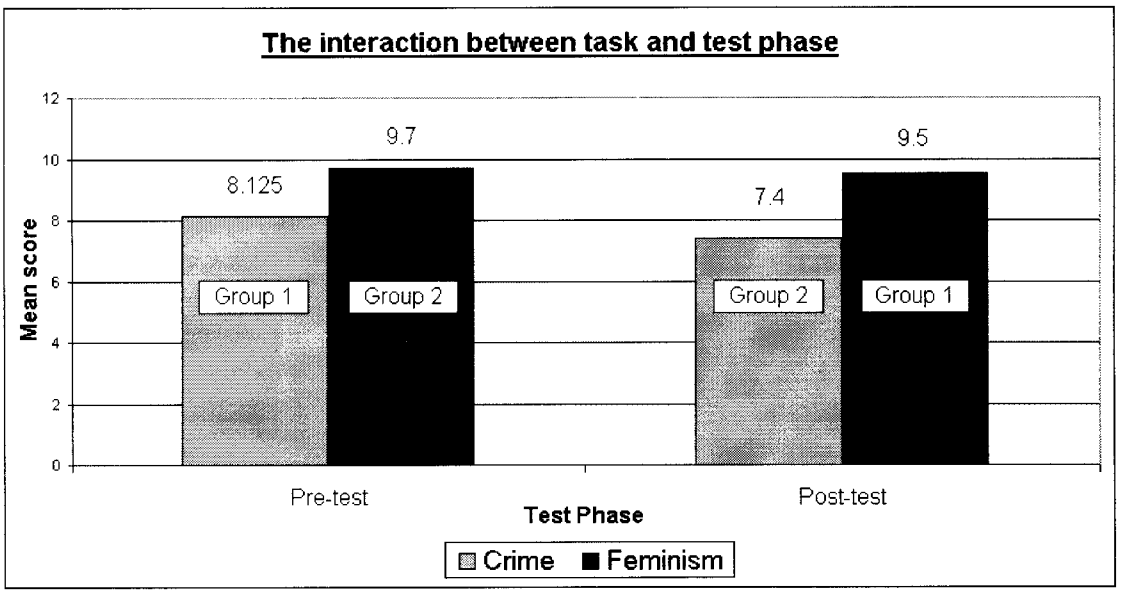
3.3 Results

A summary table of the mean scores and standard deviations in each condition of the experiment is presented in Table 3.1 below.

Table 3.1: The mean score and standard deviation for each task in each test phase of the experiment

Condition	n	Mean Score	Standard Deviation
Crime – Pre-test	8	8.125	2.588
Crime – Post-test	8	7.400	2.138
Feminism – Pre-test	10	9.700	1.889
Feminism - Post-test	10	9.500	2.171

The results illustrated in the above table indicate that the mean scores for the Feminism task are higher than those of the Crime task. The mean scores on the Pre-test condition are also higher than those of the Post-test condition. The following graph, Figure 3.1, illustrates this point more clearly. The standard deviations indicate that the variation in the Post-test condition, for both tasks is very similar. However, in the Pre-test conditions: the standard deviations indicate that the scores of participants completing the Crime task were more varied than those completing the Feminism task.



Group 1: completed the Crime task in the Pre-test condition and the Feminism task in the Post-test condition.

Group 2: completed the Feminism task in the Pre-test condition and the Crime task in the Post-test condition.

Figure 3.1: The interaction between task and test phase

A 2x2 mixed Analysis of Variance was applied to the data and results showed that there were no significant main effects. The first main effect was test phase with two levels: Pre-test and Post-test. This was not found to be significant, $F(1,16) = 1.104$, $p = 0.3091$, which indicated that there was no difference between the Pre-test condition, which involved a self-selected study technique and the Post-test technique, which was the mind map technique. The other main effect was task order, which also had two levels: Group 1 and Group 2. Group 1 refers to participants who completed the Crime task in the Pre-test condition and the Feminism task in the Post-test condition, whereas Group 2 involved participants completing the Feminism task in the Pre-test condition and the Crime task in the Post-test condition. This is also illustrated in Figure 3.1, above. The main effect of task order was not significant, $F(1,16) = 0.103$, $p = 0.7527$, thus indicating that there were

no task order effects. However, there was a significant interaction between the task order and test phase, $F(1,9) = 5.944$, $p = 0.0375$. Post hoc tests revealed that Group 2 participants scored significantly higher on the Pre-test condition (Feminism) than they did on the Post-test condition (Crime). The main effect of task was significant, $F(1,16) = 8.860$, $p = 0.0089$. As can be seen by Figure 3.1, the Crime task achieved lower results than the Feminism task. There was also no significant interaction between task and task order, $F(1,16) = 0.525$, $p = 0.4793$.

3.4 Discussion

There was no significant main effect of test phase, which originally seemed to suggest that the hypothesis of the study was not supported, in that the mind mapping (Post-test) condition did not elicit higher scores than the self-selected (Pre-test) condition. In fact, the mean scores showed quite the opposite from the predicted outcome: the self-selected study condition produced higher scores than mind mapping condition. The main effect of task order was not significant indicating that there was no difference in scores depending on whether the Crime task was completed first (Group1) or the Feminism task was completed first (Group 2). There was however, a significant interaction between test phase and task order. Post hoc tests revealed that Group 2 participants scored significantly higher on the Pre-test condition (Feminism) than they did on the Post-test condition (Crime). This suggests that the Feminism task may be easier than the Crime task or possibly that the Feminism task may be more suited to students normal studying techniques.

These possibilities were investigated by conducting another 2x2 ANOVA between the main effects of task and task order. The main effect of task was significant showing that scores on the Feminism task were higher than those on the Crime task, regardless of task order or test phase. This suggests that the Crime task was more difficult than the Feminism task. So the tasks were unequal, despite the original piloting of the task and the attempts to match questions by question type and depth. This inequality had a profound effect on the whole experiment, as it means that the Pre-test and Post-test conditions cannot be compared. It might be argued that roughly the same number of participants completed each task and the tasks were counterbalanced, therefore, there would be an equal amount of error in each test phase. However, this argument does not take into account the within subjects nature of the experiment. It is well known in higher education that students vary considerably, in terms of their ability on academic tasks and to control for such individual differences, a repeated measures design was employed. To conclude, any effects that might have been due to use of the mind mapping technique

were masked by the unequal nature of the tasks. It was felt that due to this confound, no further analysis would be practical.

Therefore, the most important consideration for future investigation of this technique is to ensure task equality. Extensive piloting will be necessary, with perhaps a number of tasks in order to select the most similar in difficulty. It would also be possible to use more than two tasks in the experiment so that if one task is shown to be unequal, then the participants' scores from the task could be removed from the analysis, leaving the remaining valid scores to be analysed. Feedback from the participants also revealed that they had some prior knowledge of the topics, which suggests a bias towards sociology and biology students. To overcome the difficult task of selecting topics that are of equal interest and relevance, it was thought that restricting the experiment to Psychology students might solve this problem. Although, it would be preferable to include a wide range of subjects, this is not necessarily practical given a study of this size. Other feedback from participants concerned the amount of time they were given to construct the mind map and answer the questions. For the latter point, in future study 10 minutes might be a more suitable time for answering questions, however, the former point is a little more difficult to resolve. The participants believed that 20 minutes was too long to learn the text in the self-selected study technique condition but the time was not long enough in the mind map condition. Otherwise, with the exception of the task inequality problem and the points raised in feedback, the experiment ran smoothly. A further study continued whilst taking the aforementioned points into consideration.

3.5: Study 4 – A further investigation into the Mind Map technique

Method

Design

A within subjects design was used in the experiment. The independent variable was test phase, which had two levels: the pre-test condition required participant to use the study techniques they normally use, and the post-test condition required participants to use the Mind Map Technique after instruction on its use. The dependent variable was the score achieved on a task. To eliminate the bias encountered in study 3, 4 tasks were used in the experiment and these were extensively piloted. This was done to ensure that if the tasks were not all equal in difficulty, then all the results would not be invalid and that only the scores from the unequal task(s) could be eliminated from the experiment. A counterbalancing procedure was also employed (see Appendix 18 for more details). This procedure removed the possibility of task order effects and also ensured that the participant did not receive the same task twice, and that each task was used equally in the experiment. This procedure also acted as a control in that no two participants, sitting next to each other were working on the same task at the same time, which removed the potential for cheating.

To ensure the smooth running of the experiment, participants were allocated into one of eight conditions according to where they were seated. Table 3.2 below indicates which task participants would be allocated in the 'Pre-test' condition (i.e. self-selected study technique) and the 'Post-test' condition (mind mapping technique).

Table 3.2: Counterbalancing procedure

Condition	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Pre-test	I	K	E	A	I	E	A	K
Post-test	K	I	A	K	E	I	E	A

Key
A = Attachment text
E = Eyewitness text
I = Intelligence text
K = Kohlberg text

This particular order was devised so that each task would be used an equal number of times in the experiment. If one (or even two) of the tasks were not equal to the others then the scores from those conditions can be removed. For example, if the 'Attachment' task was significantly different from the other tasks, then all of the scores from conditions 3, 4, 7 and 8 would be eliminated from the experiment. If two conditions were not equal, for example 'Attachment' and 'Kohlberg' then the only conditions remaining in the experiment would be conditions 5 and 6. This means that should this problem occur, some of the data is still valid. It should be noted that, if a participant completes a text which the analysis reveals to be unequal, then the scores from both the 'pre-test' and the 'post-test' condition would need to be eliminated from the results. Due to the within subjects nature of the design, if bias occurs in just one of the tasks, all of the scores from the participants completing that task must be removed.

Participants

There were 38 participants in the study, all of whom were Psychology undergraduates in their first year at Chester College of Higher Education in North West England. There was an uneven gender balance in that there were a greater number of females (35 females compared with 3 males), which, although overemphasised in this sample, tends to be the norm with Psychology undergraduates. The age range was approximately 18 to 53, and out of the 38 participants there were 23 traditional, 3 year out and 11 mature students.

Participants were all recruited by opportunity sampling. A consent form was used to ensure the participants knew their rights, and they were all treated according to BPS guidelines.

Materials

The materials for the study included a consent form (see Appendix 11) and an amended version of the Study Skill Questionnaire (see Appendix 19). The latter contained three main sections. The first requires participants to give demographic information, which included name, student number, age, year of study and status. The following section asked respondents to identify how frequently they use particular study skills. There were a total of 23 questions and responses ranged from 1, being never, to 7, being always. In order to treat the data on an interval scale, this information was recoded in SPSS to: 0 being never and 6 being always. This now means that 0 indicates that the study skill is never used, and 1 to 6 indicates that the skill is used and allows a frequency measure. The questionnaire identifies 3 different types of learning: deep skills, surface skills and mind map relevant skills. The latter combines various skills, which are used in the mind map technique. The deep skills may be found in Table 3.3, the surface skills may be found in Table 3.4 and mind map relevant skills may be found in Table 3.5. In order to calculate a score for each of these types of skills, the scores were added together and then divided by the number of questions.

Table 3.3: Deep Study Skills

Question No.	Deep Study Skill Questions
2	Do you discuss ideas with friends or people on your course?
3	Do you read intensively paying attention to detail?
6	Do you summarise your notes?
7	Do you condense notes into their simplest form (such as key words or onto cue cards)?
21	Do you formulate arguments for and against the author's views?
22	Do you try to form your own opinions on key issues?
23	Do you pose questions for yourself?

Table 3.4: Surface Study Skills

Question No.	Surface Study Skill Questions
1	Do you skim read?
4	Do you verbally rehearse material?
5	Do you rewrite lecture notes?
9	Do you use highlighting?
10	Do you use underlining?
13	Do you use repetition of notes?
20	Do your rehearse information mentally?

Table 3.5: Mind Map Relevant Questions

Question No.	Mind Map Relevant Questions
8	Do you use three or more colours in your notes and diagrams?
11	Do you use images in your notes?
12	Do you use symbols in your notes?
14	Do you make spider diagrams?
15	Do you make wall charts to help you remember material?
17	Do you use mind maps / knowledge maps / concept maps?
18	Do you make diagrams, which show connections between concepts (using arrows, lines etc)?
19	Do you organise spacing in diagrams?

The final page of the questionnaire was concerned with academic motivation. Snyder's (2000) Hope Scale was adapted for use in Higher Education by the researchers. This adapted by substituting some of the words, for example the term "school work" was changed to "degree". The participant was presented with a series of statements and they were required to indicate how applicable each statement was to them. Scores were measured on a scale of 1-7, with 1 being "definitely false" and 7 being "definitely true". Only the extremes were labelled. The Agency score is concerned with statements 1, 3, 5 and 8, and the Pathways score is concerned with statements 4,6 and 9 from the final page of the questionnaire. Agency and Pathways scores are combined in order to calculate a Hope Score. The additional components on this page of the questionnaire were devised by the experimenter and include: an item (2) to measure Extrinsic Motivation and an item

(7) to measure Intrinsic Motivation. There was also a statement to measure the student's commitment (10) in terms of how frequently they miss lectures and a statement to measure how frequently the students apply for extensions (11).

There were 4 texts used in the experiment, each of which were topics yet to be covered on the first year Psychology degree programme at Chester College of Higher Education. The extracts were taken from core textbooks and were on the following areas: Attachment (taken from Atkinson, Atkinson, Smith and Bem, 1993), Eyewitness Testimony (taken from Malim and Birch, 1998, pp.305-307) Intelligence (taken from Malim and Birch, 1998, pp.488-489), Kohlberg (taken from Carlson, Buskist and Martin, 2000, pp.421-422). Question sheets included 20 questions per text, and were devised by the experimenter. Answers and answer response sheets were also devised. A text was also used for practising the mind map technique and was also taken from the level one Psychology syllabus and was on the topic of gender role acquisition (taken from Gross,1999, pp.681-693). Copies of these texts, questions, answers and answer sheets may be found in appendices 20, 21 22, and 23 respectively. The additional materials required were 4 pens per participant (red, green, blue and black), A3 paper, an overhead projector and acetates including instructions for the study (before and after, copies of the instructions may be found in Appendix 16. Acetates of the mind map presentation were also required and copies of some of these may be found in Appendix 17. Both Microsoft Excel and SPSS, versions 10 and 11 were used to analyse the results.

Piloting of tasks

In order to select the tasks used in the experiment six texts were chosen from core textbooks on the Introduction to Psychology module. The topics that were selected had not at that time been covered in the module and should, therefore, be unfamiliar to the participant but relevant for their future exam. The pieces of text selected were each of similar length (approximately 700 words) and the experimenter constructed a mind map for each text to ensure that the material was suitable for application of the technique. From these pieces of text as many questions were devised as possible. It was agreed that

20 questions would be used for each text. The six texts and their corresponding questions were tested by 71 second year Cognitive Psychology students. Each participant was given 20 minutes to learn the text as well as possible and 10 minutes to answer the questions. Correct scores were calculated into percentages for each text, and these were compared (please see tables in Appendix 24). The four most similar texts in terms of percentage of correct answers were chosen for use in the study. The percentage of correct answers for these texts varied by no more than 6% of each other. Each of the 4 texts was then broken down by question. Individual questions were matched for deep questions and surface level questions. Also questions were replaced or changed where ceiling or floor effects occurred. Answers were written out before the experiment to eliminate bias. The texts, which were not selected, were on the topics of Language (taken from Malim and Birch, 2000, p.384-385) and Personality (Carlson, Buskist and Martin, 2000). Copies of the texts can be found in Appendix 25.

Procedure

Participants were seated and asked to complete a consent form and a Study Skill Questionnaire and after completion, several sheets of A3 paper and pens were distributed to participants. The experimenter explained that all materials used in the study were taken directly from the level one Psychology syllabus for a core module (Introduction to Psychology) in order to ensure that the information was of relevance to the participants. Participants were informed that before the study skills training began, a task was to be completed. Instructions were put on acetate on an overhead projector, which instructed participants to read the passage of text that they were presented with, and to learn it using the study techniques they normally use. They were given 20 minutes to complete this task. The text and any notes made by the participants were collected and the participants were then presented with a set of 20 questions and an answer sheet. They were given 10 minutes to answer as many questions as possible and then question and answer sheets were collected. Participants were subsequently given a presentation on Mind Mapping. This included mind map laws and principles, how to read a mind map and also how to construct a mind map from a piece of text. Worked explains were also shown. The

participants were given the opportunity to construct their own mind map, in pairs or small groups with guidance from the experimenter. Please refer to Study 3 for a fuller explanation of this presentation.

In the second test phase, the participants were given a different piece of text to the one they had learnt previously. Instructions were again put on the overhead projector directing participant to learn the piece of text using the mind map technique as they had just been taught. After 20 minutes texts and mind maps were collected and question and response sheets were given out. After 10 minutes questions and answers were collected and participants were thanked and debriefed. The experimenters then graded the mind maps for quality on a scale of 1 to 5, according to the criteria in Table 3.6.

Table 3.6: The criteria by which mind maps were graded for quality

Mind Map Quality	Content Score	Amount of detail
		Appropriateness of keywords
		Whether mind map was completed
		Whether information on the mind map was correct
	Presentation Score	Use of hierarchy
		Whether it can be clearly read
		Use of space
		Use of imagery and codes

3.6 Results

Test Phase

The following table shows the means and standard deviations of each test phase in the experiment. It can be seen in Table 3.7, that the mean score in the Pre-test condition is higher than in the Post-test condition, indicating that participants recalled more information when using a self selected study technique.

Table 3.7: The mean score achieved on a task and standard deviation in each test phase of the experiment

Test Phase	Pre-test	Post-test
Mean	11.118	10.224
Standard Deviation	2.776	3.635

The standard deviation in the Post-test condition, however, is higher than in the Pre-test condition. This indicates that there is a greater variation in scores when the Mind Map technique was used when compared with a self-selected study technique. A paired t-test was performed on the data and revealed no significant differences between test phase, $t(37) = 1.483$, $p = 0.735$. Therefore, there were no significant differences between the Mind Map condition and a self-selected study technique.

Task

The following table shows the mean score and standard deviation for each task used in the experiment. It can be seen from Table 3.8 that participants completing the task on the subject of Eyewitness testimony achieved the highest marks.

Table 3.8: The standard deviations and mean scores achieved on each task used in the experiment

Task	Attachment	Eyewitness	Intelligence	Kohlberg
Mean	10.472	11.611	10.500	10.175
Standard Deviation	2.857	3.466	2.838	3.778

The standard deviations reveal that the greatest variation in scores was in the group completing the task on the subject of Kohlberg. A one-way ANOVA was performed on the data and no significant difference was found between the 4 tasks used in the experiment, $F(3,72) = 0.692$, $p = 0.560$.

Mind Map Quality

The experimenters graded the quality of the mind maps and the average score for each measure can be found in Table 3.9.

Table 3.9: The average score for each mind map quality measure

Mind Map Quality Measure	Average Mind Map Quality Score	Standard Deviation
Amount of detail	3.42	0.919
Appropriateness of keywords	3.97	0.753
Whether mind map was completed	4.42	0.976
Whether information on the mind map was correct	4.84	0.370
Use of hierarchy	3.68	1.042
Whether it can be clearly read	3.89	0.606
Use of space	3.82	0.865
Use of imagery and codes	2.68	1.068
Overall Content Score	4.17	0.470
Overall Presentation Score	3.52	0.616
Mind Map Quality Score	3.84	0.450

A Pearson's correlation was conducted on the data to examine the relationship between mind map quality scores and scores on the post-test condition. Results indicated that there was no significant relationship, $r = 0.242$, $p = 0.143$.

Motivation

The data was then analysed to examine the effect of motivation on the scores produced from each test phase of the experiment. A Pearson's correlation was conducted on the data to examine the relationship between motivation and scores on the post-test condition. Results indicated that there was no significant relationship, $r = 0.128$, $p = 0.450$.

The Effect of Question Depth and Type

To examine whether the mind map technique is more effective when learning different types of material the effect of question type was examined. A 2x2x2 repeated measures Analysis of Variance was conducted to examine the following variables Test Phase, Depth of Question (i.e. the type of learning that was required to answer the question) and Type of Question. Test Phase is a within-subjects variable with two levels: pre-test and post-test. Depth of Question is a within subjects variable with two levels: Deep and Surface level questions, and Type of Question is a within subjects variable with two levels: Open and Closed questions. The design of the ANOVA is illustrated in Table 3.10.

Table 3.10: The 2x2x2 ANOVA design to show the interaction between Test Phase, Depth of Question and Question Type

Test Phase	Depth of Question	Type of Question
Pre-test	Deep	Open
		Closed
	Surface	Open
		Closed
Post-test	Deep	Open
		Closed
	Surface	Open
		Closed

The mean score achieved in each of the conditions detailed in Table 3.9 can be seen in Figure 3.2 below.

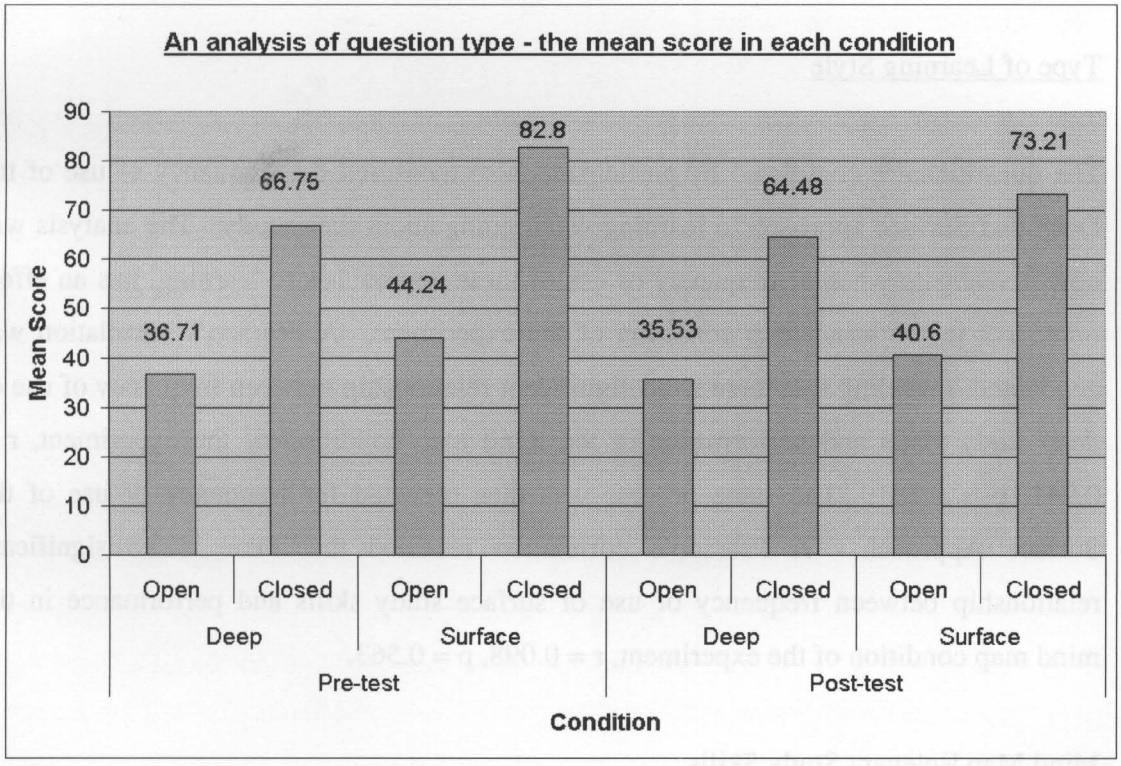


Figure 3.2: The mean score achieved when examining the interaction between Test Phase, Depth of Question and Question Type

The graph clearly shows that the highest scores are achieved when answering Closed questions and scores were also higher on questions, which required Surface level learning when compared with Deep level questions. The 2x2x2 ANOVA revealed no significant main effect of test-phase as stated in the initial t-test of this results section. However, the main effect of Depth of Question was significant, $F(1,37)=10.049$, $p = 0.003$**, and it can be seen from Figure 3.2 that Surface level questions achieved higher scores that Deep level questions. The main effect of Type of Question was also significant, $F(1,37)$ $112.268 =$, $p < 0.001$**, and Figure 3.2 showed that Closed questions achieved higher mean scores than Open questions. There was, however, no significant interaction between Test Phase and Depth of question, $F(1,37) = 1.395$, $p = 0.245$, and there was no significant interaction between Test Phase and Type of question, $F(1,37) = 0.466$, $p = 0.499$. There was also no significant interaction between Test Phase, Depth of Question and Type of Question, $F(1,37) = 0.267$, $p = 0.604$.

Type of Learning Style

The questionnaire completed by participants also measured the frequency of use of the Deep and Surface approach to learning when going about their study. The analysis will now investigate whether frequency of use of these approaches to learning, has an effect on scores in the mind map condition of the experiment. A Pearson's correlation was conducted, revealing that there is no significant relationship between frequency of use of deep study skills and performance in the mind map condition of the experiment, $r = 0.241$, $p = 0.151$. The same process was then repeated for frequency of use of the Surface Approach. A Pearson's correlation revealed that there is no significant relationship between frequency of use of surface study skills and performance in the mind map condition of the experiment, $r = 0.098$, $p = 0.563$.

Mind Map Relevant Study Skills

The questionnaire completed by participants also asked about the frequency of use of a range of skills that are involved in mind mapping. The analysis will now investigate

whether frequency of use of these skills, has an effect on scores in the mind map condition of the experiment. A Pearson's correlation was conducted, revealing that there is no significant relationship between frequency of use of mind map relevant study skills and performance in the mind map condition of the experiment, $r = 0.061$, $p = 0.725$.

3.7 Discussion

The main aim of the study was to determine whether the mind map technique is a favourable method of study in comparison to a self selected technique. The results showed that there were no significant differences between the scores in the self-selected study condition and the mind mapping condition. The hypothesis of the study: that the mind mapping method of learning would improve scores on a task, was, therefore, not supported. Although it did not reach significance, the mean scores indicated that participants actually achieved higher scores in the self-selected method of study condition. A comparison of the standard deviations revealed that there was a greater variation in scores in the mind map condition. The results did show, however, that there were no significant differences between the four texts used in the experiment, thus indicating that they were of equal difficulty and that the problems encountered in the pilot study had been overcome successfully.

The findings also suggest that mind mapping may not an advantageous technique for learning when recall is dependent on particular types of questions. A 2x2x2 ANOVA was applied revealing no significant differences between each condition (mind map and self-selected) regarding the suitability of type of question (i.e. deep/surface and open/closed). This suggests that certain types of questions are not particularly suited to the technique when compared with normal methods. The study also showed that students who were more motivated (i.e. scoring higher on the hope scale) did not perform better in the mind map condition. The results also showed that students who indicated that they used mind map related skills (Study One for a breakdown) regularly did not score higher than those who did not use them regularly. Therefore, this indicates that even when the individual skills necessary to mind map are well practised, the students did not do any better.

When the results are considered in the light of previous research and compared with the hypotheses of the study, there are many diverse and interesting findings. The finding that there were no significant differences between scores on tasks when mind mapping was

used when compared to a self-selected technique did not support the main hypothesis of the study.

It was hypothesised that mind mapping would be a preferable technique because material was being encoded by two different methods of processing in Working Memory: The use of the phonological loop for verbal processing of material, and use of the visuo-spatial sketch pad for encoding of visual and spatial material. It was argued that when linear notes are used, only the phonological loop is employed as material is only coded in a verbal manner. However, this was not supported

It was also hypothesised that, following the findings of Miller (1956), the branches of mind maps could be thought of as chunks and that provided that there were seven plus or minus two branches, the information could be held in STM until the recall was allowed. This was not supported by the findings. However, the results could be explained by the findings of a study by Chase and Simon (1973). They found, when investigating chess players according to their expertise, that the main difference between novices and experts was the size of chunks that they could store. Although the number of chunks was consistent with Miller's findings, i.e. experts cannot store more pieces of information in short-term memory, but they can hold much more information in each chunk. Mind mapping, like chess, is a complex activity and it could be suggested that novice mind mappers can only encode relatively small chunks. In the chess study, the chunks to be memorised were the positions of pieces on a chessboard, in the mind map study, however, the chunks refer to pieces of information, not only those on the mind map itself (i.e. the keywords or images) but the schemas that these keywords and images represent. The chunks could, therefore, range from: something relatively simple such as a single piece of detailed information, which would be found on the small branches at the edge of the map, to much larger categories of information, which would be found on the main branches. In this case, not only the key concept would be recalled but all the detailed information branching from that theme. This could explain why in this study mind mapping was not preferable to self-selected techniques. With practice larger chunks, i.e. the whole branches on the mind map, may be encoded and mind mapping may then be

shown to be preferable. Chase and Simon (1973) also found that practice was the key variable in determining expertise in chess. Mind mapping may depend on practice in the same way. However, this suggestion conflicts with the finding that students who regularly use mind map related skills, did not score higher than those who did not use them regularly. Therefore, this indicates that even when the individual skills necessary to mind map are well practised, the students did not perform any better. This would suggest that there are two conceivable possibilities: firstly that mind mapping is not effective for learning a text in this way or alternatively, that further practice of the technique as a whole is necessary. However, if students are able to pull out appropriate keywords and arrange them diagrammatically with colour, it would suggest that they were already well practised.

It was also predicted that the use of the mind mapping technique would lead to improved recall due to the technique requiring an active engagement with the material to be learnt and a deep level of processing. Craik and Lockhart (1972) demonstrated that when information is processed at a deep level, recall is greatly improved when compared to surface processing. The Study Skill Questionnaire revealed that techniques involving shallow processing, such as rote rehearsal are commonly used by students. It may be inferred from this finding that self-selected techniques are likely to involve some measure of surface processing. The process of mind mapping, however, clearly involves a deep level of processing, as the technique involves a number of stages. Firstly, participants were required to read the passage thoroughly, in order to gain an understanding of what it is about. Then, keywords or the main themes in the text were selected and the mind map would then begin to be constructed. In order to do this a sound understanding of the text is necessary, as the student needs to reorganize the themes in the text hierarchically. This requires an understanding of relations between the key concepts. Once the map is created (ideally using colour and imagery) the map then needs to be learnt. However, this hypothesis was not supported. It could be suggested that if mind maps were not done properly that surface levels could be employed. But when mind map quality was tested this was not significant.

The finding that the quality of mind maps had no significant effect on the performance of the students goes against the findings of Farrand, Hussain & Hennessay (2002), who found that students who created high quality mind maps benefited from the technique. Gibbs (1981) pointed out that even if you have two identical sets of notes, you still have no idea of what processes were gone through to get to that position. The same is true of a mind map. Although two mind maps may appear outwardly similar, it is difficult to identify and measure the depth of the schemas behind each keyword or image or the understanding behind each colour coding. The finding that students who were more motivated (i.e. scoring higher on the Hope scale) did not perform better in the mind map condition also goes against the findings of Farrand, Hussain & Hennessay (2002), who found that motivated students benefited from mind mapping. Krapp (1999) found that an interest should be present in order for a student to succeed to the best of their ability. The researchers attempted to maximise interest by taking the task material directly off the Psychology level one syllabus, so that the information was relevant to the student and in their subject area for a module that they had chosen to take. However, this study only measured motivation to succeed in the degree rather than motivation to learn the mind map technique or indeed interest in it. It can be assumed, however, that the students were interested in improving their study skills or they would not have taken part in the experiment. The hypothesis derived from the research of Pask and Scott (1972; cited in Richardson, 1983) was also not supported, in that mind mapping did not benefit serialist learners by encouraging them to look at the bigger picture and it did not benefit holist learners by encouraging them to focus on detail.

So, despite the improvements made since the pilot study the mind mapping technique did not increase recall or recognition in the experiment. This could be due to a number of reasons. Firstly, it is quite possible that the mind map technique is not a favourable method of learning. The technique may not in fact be of any more benefit to students than other commonly used methods of study. However, it must be noted that the findings of this study are certainly far from conclusive and a great deal of testing would have to be necessary before such a bold claim could be supported. The second possibility is that mind mapping is a successful technique but having one training session with a 20-minute

practice session before testing is not sufficient to master the technique and use it to its full ability. Following the implications of a study by Chase and Simon (1973), it might be the case that practice is essential for the technique to be used effectively. The third possibility is that mind mapping is a successful technique but only for particular types of learners. Pask and Scott (1972, cited in Richardson, 1983) found that there are two distinct categories of learning strategy: a 'holist' approach and a 'serialist' approach. It is quite possible that only students with a 'holist' cognitive style could benefit from mind mapping. The technique could pull together what they were doing anyway and allow focus on detail within the big picture. For serialist learners, who focus on detail and learn using more of a 'bottom up' style, the technique may not be suited, due to its top-down nature. Holist learners may find it a useful method to organise their thoughts as they look at the bigger picture in a top-down manner, whereas serialists would in effect be working from the edge of the map, starting with the detail and gradually moving inwards towards a greater understanding. This method would not lend itself to mind mapping.

The study was restricted in terms of the number of participants, which was small due to problems recruiting. Also the study was restricted in the sense that only first year Psychology students took part, which was done to solve the problem from the pilot study of the texts and choosing things relevant to all and equal in terms of interest. The study was limited in the sense that there was no measure to determine what the students were doing in the self-selected study condition. Although, students' notes were collected to ensure that mind mapping was not used by any of the participants, it is very difficult to know what processes have been engaged just by looking at a set of notes. The students could, in fact, have been using a deep level of processing but one cannot be sure. However, it is certain that this method of learning is well practised by the student, assuming they followed the directions of the study. There may have also been limitations due to the length of time, which participants had learn the information and construct a mind map. Participants felt that in the mind map condition, this was not long enough, but in the self-selected condition, too much time was allowed. However, to ensure that the experiment was valid the time had to be equal in both conditions. It is also possible that boredom and tiredness played a role, as the experiment was quite lengthy. Also only

certain types of people may actually volunteer to take part in a study skill task and these people may not be representative of the student population. In addition, if mind mapping encourages deep learning it might be more effective when there is a time interval between the learning and the testing. Giving students a passage to read and learn and then testing them on it a few minutes later might well favour surface learning and short-term memory.

The main finding to come out of this study is that mind mapping may not be a favourable study technique when compared with the students preferred method, when little time is available for practice. It would be beneficial to study a group of students as they learn the mind map technique and to study them longitudinally monitoring their progress as their use of the technique develops. Although the study asked participants to report on their study techniques, there were no individual differences identified. This means that those who did improve with the mind map technique could not be grouped according to particular characteristics. Qualitative interviews may be useful, to get an understanding of self-selected techniques and a greater understanding of the mind maps produced, explaining schemas behind keywords, images and symbols relation between concepts. Teach-back was also a technique that Pask and Scott (1972; cited in Richardson, 1983) found very useful, whereby the student had to tech the information they had just learnt, back to the experimenter. Although this study looked at how information could be put into a mind map from a text, it may also be useful to look at how information could then be taken back out of the mind map and back into a text, for example, in the form of an essay. The applicability of this technique is extremely varied and much research is needed before, its efficacy can be fully determined.

Chapter 4 - General Discussion

Study One highlighted a number of issues: firstly that when studying for exams repetition is one of the most frequently used skills, however the skill is infrequently used, when studying for coursework. Study Two revealed that Deep study skills were used more frequently, when studying for exams than coursework. Surface study skills were used very little for coursework, which supports the findings of Study One. There is research to suggest that students tend to rely on a core approach to their study (Schmeck, 1983; in Vermetten, Lodewijks and Vermundt, 1999). This indicates that, if surface skills such as repetition are consistently applied in the learning environment, students are not actually leaning the material when studying for coursework, rather that they are simply reproducing what they have just read. This is a concerning prospect but may explain some of the poorly structured and disjointed essays which lecturers receive. To write a good essay, lecturers concur that students must not simply replicate information from books, but that material must be learnt (Marton, Hounsell & Entwistle, 1997).

Study One did not support the findings of a number of researchers who reported gender differences in both study strategies (Biggs, 1987; Severiens and Dam, 1994; cited in Meyer, 1995) and motivation (Jacobs and Newstead, 2000). Zeegers (2001), however, found there to be no gender differences in approaches to learning. Study One also concluded that there were no differences according to Path of Study. Study Two examined a greater range of study skills and showed that the most frequently used study skills involved note-taking and use of the library. The least frequently used involved mnemonics and mind maps. When motivation was examined, Agency was found to be higher than Pathways thought and intrinsic motivation was found to be higher than extrinsic motivation.

Study One showed that in terms of progression through the degree course there were no differences in study skill use. This was further examined in Study Two, as there were only a limited number of study skills in the preliminary study. Study Two found that first years use Surface skills for coursework more frequently and strategic study skills less

frequently than other years. Third years use Deep skills for exams more frequently than other years and although the use of Deep skills when studying for coursework was not significant, there was an increase in their use across the degree course. When information is processed at a deep level, there is an increased likelihood that the information will be learnt (Craik and Lockhart, 1972). This finding would seem to indicate that as students progress through the degree course they are using more sophisticated study skills. Study One showed significant differences in terms of motivation, which decreased though the degree course, as did intrinsic motivation. This is a particularly concerning finding and does not support the notion of 'exit velocity', which refers to an increase in activity and motivation just prior to course completion (Jacobs and Newstead, 2000). Study Two, however, showed that Pathways and Hope, showed a significant decrease in year two but rose again in year three. This supports Jacob and Newstead's finding of 'second year blues', but it is encouraging that motivation recovers in the third year. Although it did not reach significance in Study Two yet it did in Study One, Agency continued to decrease across the degree course. This implies that, although Pathways thought increases in year three and students find themselves motivated to get past obstacles between themselves and their goals, students' drive to succeed continues to plummet as the degree course progresses. These particularly concerning findings could be explained in a number of ways. Degree weightings for each year of the course may have a prominent effect. There is a common perception that first year 'doesn't count' and the second year in many universities has a lower percentage weighting, usually around one-third of the final mark. Students may be following an "I'll do it tomorrow" philosophy and may be putting off serious learning until "it really counts". By the time the student reaches third year, they could well be out of the habit of good study skills and hard work. This may lead them to realise that when it comes to the crunch, their ability is not as good as they had hoped and they are not able to deal with the workload as their skills have not developed. The students may find independent study difficult without the demands, structure and support of school and Further Education. The structure of Higher Education is very different from sixth-form college and students are required to manage their own workload and to motivate themselves. Going to university is often the first time that traditional students have lived

away from their parental home and they, therefore, have a great deal more freedom in their personal lives, in addition to freedom in their academic lives. This could lead to distraction and a loss of routine studying. The students may be entering Higher Education with unrealistic beliefs about their own ability, the workload and their interest or expectations about the course material.

Study One showed no difference between mature and traditional students in terms of study skill use, however, the study found that mature students are significantly more motivated than their younger colleagues. This does not support the findings of Biggs (1987) and Zeegers, Martin and Martin (1999) who found an increased use of Deep strategies with older students. The finding does, however, support Richardson's (1994) assertion that mature students are far from lacking in the basic skills, which are essential for student learning. The analysis also showed that students who took a year out were no different from traditional students in terms of study skill use and motivation. So, mature students are significantly more motivated than their peers but they use the same study skills with the same frequency. Mature students are also more intrinsically motivated and less extrinsically motivated than their younger colleagues and they spend more hours in independent study. This suggests that despite an increased determination to succeed and an increased commitment, mature students are not doing anything different, in terms of how they study. This increased motivation and commitment may be due to a number of factors. The material and psychological costs of entering higher education increase with age (Biggs, 1987). Although, course fees are the same for all students, mature students often have to support themselves, whereas many traditional students seek help from their families and may have a 'meal ticket mentality' (Biggs, 1987). Mature students may also have other commitments, such as mortgages and families. They may also understand the consequences of taking out student loans more realistically than traditional students. The decision to enter Higher Education has to be a conscious one for mature students. Traditional students may see Higher Education as a logical progression from school to college to university. After consideration of all of these material and psychological costs, if a mature student decides to enter Higher Education, they are likely to have a higher determination to succeed. One might assume that if this group of highly motivated

students were trained to use the most effective study skills, the students would display better academic performance.

Study Two showed that there were no differences in the use of the Deep approach between Arts and Science, however, Science students score higher on the strategic and surface approach than Arts students. English students use the Deep approach more frequently than Biology students and they use the Surface approach significantly less than Psychology and Sports Science students. This supports the findings of Biggs (1987) who argues that Science students use the surface approach more than Arts students. Study Two found that Psychology students use deep and surface study skills more than other students when studying for exams but not coursework. They were also found to use the strategic approach significantly more than other students and to have higher Agency but not Pathways. Psychology students also reported that they do an average of 2 hours independent study more than other students. The difference in study skill types could be explained by a number of reasons. The researchers are psychologists and may have based the questionnaire on skills, which are specific to the Psychology discipline or the type of learners it attracts. Also the discipline of Psychology examines the learning process and human memory, which should give students a greater insight into their own studying and the different techniques available to them. The higher motivation of Psychology students could be explained by an awareness that the researcher worked in the department. Psychology students may have felt more pressure than other students to rate their motivation and commitment higher. However, the findings suggest that care should be taken when investigating student learning, particularly when using Psychology students as a population.

Perhaps the most important finding from this study is that mature students are significantly more motivated than their younger peers and are prepared to invest much more in their studies, in terms of time and effort. Therefore, it was thought that it would be of great benefit for these students, and indeed highly motivated traditional students, to find a technique, which could help to achieve their learning potential. Study Three examined the efficacy of the mind map technique. Despite piloting, the first attempt at

testing the study skill was biased due to task inequality, which meant that any effect of using the mind map technique was masked by the unequal nature of the tasks. Extensive piloting was then used to ensure that no such problem occurred in the following experiment (Study Four), which was successful. Results showed that the mind map technique was not significantly different from using self-selected study techniques and the hypothesis was not supported. The participants in the self-selected study technique condition of the experiment actually performed better than those in the mind map condition, although this did not reach significance.

Following the findings of Farrand, Hussain & Hennessay (2002), the study examined the effect of Mind Map quality and motivation. However, analysis revealed that there was no significant relationship between these factors and performance on the mind map study. Therefore, this study does not support the findings of Farrand, Hussain & Hennessay (2002) who found that the Mind Map technique was a superior study skill, provided that motivation and mind map quality are high. However, as Gibbs (1981) pointed out, even if you have two identical sets of notes, it is not possible to understand the processes undergone to create them. So, although two mind maps may appear outwardly similar, it is difficult to identify and measure the depth of the schemas behind each keyword or image or the understanding behind each colour coding. Thus, mind map quality is only an indication of the thinking that has gone on behind it.

Study Four examined whether mind mapping was an advantageous technique for learning when recall is dependent on particular types of questions. However, analysis revealed that mind mapping was not a favourable technique when answering open or closed questions, or when answering questions requiring either deep or surface learning. Study Four also showed that students who indicated that they used the skills necessary to mind map (please see Study Two for a breakdown of mind map relevant skills) regularly did not score higher on the tasks than those who rarely used them. Chase and Simon (1973) found that practice was the key variable in determining expertise in chess and it was hypothesised that mind mapping may depend on practice in the same way. However, this suggestion conflicts with the finding that students who regularly use mind map related

skills, did not score higher than those who did not. Thus suggesting that even when the individual skills necessary to mind map are well practised, the students did not perform any better.

It could be suggested that there are a number of reasons why the hypothesis of the study was unsupported and mind mapping was not a favourable technique. Firstly that mind mapping is not effective for learning a text in this way. The technique may not in fact be of any more benefit to students than other commonly used methods of study. Alternatively, the issue of practice may explain the findings. Although frequent users of mind map relevant skills may not have performed better than those who use them infrequently, it may be the case that success with the technique requires further practice of the technique as a whole, rather than its components. One training session with a short practice session before testing may not be sufficient to master the technique and use it to its full ability. Also it may be that the benefits of the technique may be apparent after a longer time period. Immediate (or almost immediate) recall may encourage surface techniques, whereas if the participants were tested after an extended time period, the deep learning used to create a mind map may produce higher scores on a task. It may also be useful to examine, not only how information from text can be put into a mind map, but how information could then be taken back out of the mind map and turned into an essay.

It is also possible that mind mapping is a successful technique but only for particular types of learners. Pask and Scott (1972, cited in Richardson, 1983) identified two distinct categories of learning strategy: a 'holist' approach and a 'serialist' approach. It may be that only students with a 'holist' cognitive style could benefit from mind mapping. The technique could enhance their existing methods and allow focus on detail within the bigger picture. For serialist learners, who focus on detail and learn using more of a 'bottom up' style, the technique may not be suited, as they would in effect be working from the edge of the map, starting with the detail and gradually moving inwards towards a greater understanding. Future study could attempt to identify learners in this way and examine any differences.

Although the major problem of task inequality was solved in Study Four, the findings of the research may have been affected by methodological issues. Firstly, due to the within subjects nature of the experiment, the self-selected study technique condition had to be completed first. The experiment was quite lengthy and participants may have suffered with fatigue or boredom and consequently paid less attention, which might explain the lower score in the mind map condition. It is possible that the selection of participants in the experiment may have influenced the results. They were all first year psychology students and volunteers and may not be representative of the student population. There were also small numbers due to problems recruiting. The study did not identify which study techniques were used in the self-selected study condition, as it is impossible to know what processes have been engaged just by looking at a set of notes. This may, however, be an area of interest for future study.

Feedback from the participants indicated that there may have been an issue due to the length of time allowed to learn the information and construct a mind map. It was felt that too little time was allowed to employ this new technique and learn, whereas in the self-selected condition, too much time was allowed. The experimental design deemed this appropriate.

Overall it was felt by the experimenters that the issue of practice was the most salient of the above issues. Future study would most benefit from a longitudinal study of students as they learn to mind map, monitoring their progress as their use of the technique develops. Qualitative interviews may be useful, to get an understanding of self-selected techniques and a greater understanding of the mind maps produced, explaining schemas behind keywords, images and symbols relation between concepts. The mind map technique can be applied in many different ways and much research is needed before its efficacy can be fully determined.

Chapter 5 - References

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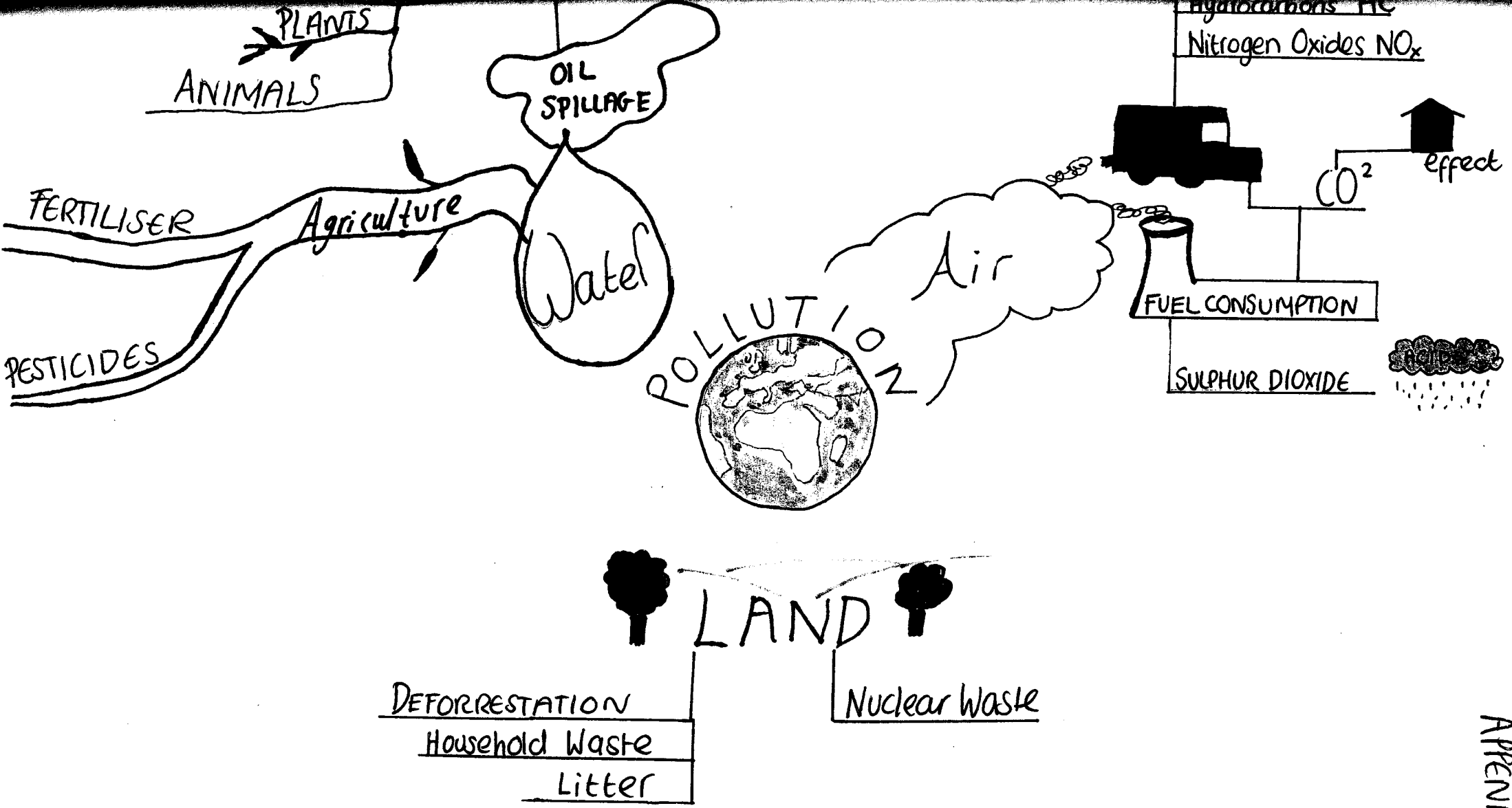
Chapter 6 - Appendices

Appendix	Title
1	Example of a Mind Map
2	Participants' subjects of study in the preliminary study (Study One)
3	Study Skill Questionnaire for study one
4	Study skill frequencies for study one
5	Results from an open-ended question in study one
6	Tables of ANOVAs for study one
7	Study Skill Questionnaire for study two
8	Study skill frequencies for study two
9	Tables of ANOVAs for study two
10	Classification of arts and sciences for study two
11	Consent form for study three
12	Texts for study three – Crime, and Feminism
13	Questions for study three – Crime and Feminism
14	Answers for study three – Crime and Feminism
15	Answer sheets for study three – Crime and Feminism
16	Instructions for studies three and four – Pre-test and Post-test
17	Mind map presentation for studies three and four
18	Counterbalancing procedure for study four
19	Study skill questionnaire for study four
20	Texts for study three • Attachment • Eyewitness Testimony • Intelligence • Kohlberg's theory of moral development • Gender Role Acquisition

21	Questions for study three • Attachment • Eyewitness Testimony • Intelligence • Kohlberg's theory of moral development
22	Answers for study three • Attachment • Eyewitness Testimony • Intelligence • Kohlberg's theory of moral development
23	Answer sheets for study three • Attachment • Eyewitness Testimony • Intelligence • Kohlberg's theory of moral development
24	Results breakdown from pilot study
25	Additional pilot materials • Language • Personality


PLANTS
ANIMALS
OIL SPILLAGE
FERTILISER
Agriculture
Water
PESTICIDES
POLLUTION
Air
Hydrocarbons HC
Nitrogen Oxides NO_x
CO^2
effect
FUEL CONSUMPTION
SULPHUR DIOXIDE
ACID
LAND
DEFORRESTATION
Household Waste
Litter
Nuclear Waste

APPENDIX 1

APPENDIX: 2

Pilot SSQ - Subject studied by participants

	Subject 1	Subject 2
B.Ed	9	1
Nursing	1	0
History	3	3
Geography	7	4
Computer Science	8	3
Business Studies	8	1
English	8	11
Drama	7	7
Maths	4	3
Psychology	25	5
Theology	2	3
Art	3	1
Software Engineering	1	0
P.E. and Sports Science	9	1
Animal Behaviour	3	0
Counselling	1	0
Biology	4	0
Tourism	1	0
German	0	1
Health Studies	0	2
Sociology	0	8
Not Applicable	0	50
Total	104	104

APPENDIX 3.

Thank you for volunteering to participate within this study, in which we are investigating the use of student learning techniques. The measurements simply involve ticking boxes and rating items on scales of one to seven. Confidentiality and anonymity will be maintained, and if you feel uncomfortable at any time you are free to withdraw.

Male ☐ ☐ Female Age ☐☐

Year of study ☐1 ☐2 ☐3

Have you had a break in your education ? (e.g. year out, mature student, etc)

Yes ☐ ☐ No

What subject(s) are you studying? Single hons ☐

First subject ☐ Joint hons ☐

Second subject ☐ Major/ Minor ☐

Directions: Read each item carefully. Using the scale below, please select the response that best describes YOU. Please put an X in the appropriate box. Students who are taking more than one subject, please give information for both subjects (single hons. please just complete the left side).Please note details for exams and coursework.

Do you plan your study beforehand (e.g. timetable)?

Subject 1			*Subject 2*	
Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Alw
Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Alw

Do you look over lecture notes and do essentiăl reading?

Subject 1			*Subject 2*	
Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Alw
Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Alw

Do you highlight key words and relevant information?

Subject 1			*Subject 2*	
Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Alw
Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Alw

Do you use repetition of notes or mental rehearsal?

Subject 1			*Subject 2*	
Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Alw
Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Alw

ou skim read notes and chapters (e.g. looking at highlighted points and headings, etc)?

ct 1			*Subject 2*		
	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always	
sework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always	

ou read intensively, paying attention to details?

ct 1			*Subject 2*		
	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always	
ework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always	

ou look at past exam papers ?

ct 1			*Subject 2*		
	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always	
ework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always	

Deleted

ou use charts and diagrams as study aids?

ct 1			*Subject 2*		
	Never 1 ☐☐☐☐☐☐☐ 7 Always		Exam	Never 1 ☐☐☐☐☐☐☐ 7 Always	
sework	Never 1 ☐☐☐☐☐☐☐ 7 Always		Coursework	Never 1 ☐☐☐☐☐☐☐ 7 Always	

t is your main technique for learning material?

Please indicate which of the following statements applies to you using the following sc

1 = Definitely False ***7 = Definitely True***

	Definitely False (1)						Definite True (7)
1 I am keen to get a good mark for my final degree	☐	☐	☐	☐	☐	☐	☐
2 I am motivated by other peoples' expectations rather than my own	☐	☐	☐	☐	☐	☐	☐
3 I am determined to work hard in my study to achieve my desired outcomes / career aspirations	☐	☐	☐	☐	☐	☐	☐
4 Even if the course is difficult I find a way to succeed	☐	☐	☐	☐	☐	☐	☐
5 For each module I put as much effort in as possible	☐	☐	☐	☐	☐	☐	☐
6 I think of a lot of ways to make good grades	☐	☐	☐	☐	☐	☐	☐
7 I need to achieve goals for myself more than anyone else	☐	☐	☐	☐	☐	☐	☐
8 I nearly always get the grades I want in my academic work	☐	☐	☐	☐	☐	☐	☐
9 There are lots of ways to meet the challenges of my modules	☐	☐	☐	☐	☐	☐	☐
10 I very rarely miss lectures	☐	☐	☐	☐	☐	☐	☐
11 I very rarely apply for extensions	☐	☐	☐	☐	☐	☐	☐

Thank you for your time and cooperation in completing this questionnaire.

APPENDIX: 4

Frequencies – Pilot Study Skill Questionnaire

Study Skill	0	1	2	3	4	5	6	Mean	SD
Do you plan study beforehand? (exam)	1	7	10	17	31	14	18	3.81	1.492
Do you plan study beforehand? (coursework)	3	8	13	21	29	15	14	3.55	1.492
Do you do essential reading? (exam)	1	6	5	19	20	26	17	3.99	1.491
Do you do essential reading? (coursework)	3	7	13	19	13	24	23	3.83	1.700
Do you highlight key information? (exam)	5	7	9	12	20	19	22	3.86	1.819
Do you highlight key information? (coursework)	6	8	8	19	18	22	23	3.81	1.800
Do you use repetition? (exam)	6	3	7	12	13	23	29	4.19	1.791
Do you use repetition? (coursework)	13	11	14	19	22	15	9	2.99	1.795
Do you skim read notes? (exam)	1	6	7	16	24	25	16	3.97	1.480
D o you skim read notes? (coursework)	1	9	8	18	25	26	17	3.89	1.535
Do you read intensively? (exam)	4	9	16	23	17	15	11	3.29	1.651
Do you read intensively? (coursework)	7	12	17	15	22	21	10	3.27	1.735
Do you look at past exam papers? (exam only)	6	8	11	4	15	24	26	3.99	1.944
Do you use charts and diagrams? (exam)	17	8	16	11	12	16	13	2.94	2.063
Do you use charts and diagrams? (coursework)	27	10	18	12	15	7	14	2.48	2.058

APPENDIX: 5

Response to question: What is your main method of study?

use of diagrams
repetition of notes
detailed essay plans
spider diagrams
pray
examine module
do essays
bullet points
categorise notes
visualise information
concentrate on details
remember concepts
recommended reading
reading textbooks
notes from lectures
cue cards
re-reading
work out what is essential to know
look at thins in detail
test and retest with colleague
theme words
past exam papers
question spot
surf the net
diagrams
mind maps
wall charts
mnemonic techniques
example questions or exercises
3 pints and a curry
learn notes like a script
associate with music
night before
photographic memory
read chapter reviews and summaries
library books
concise notes
key points
underlining / summarise what have read
use of colours
symbols

different sizes of writing
pictures / illustrations
3 pints and a donner
no response
skim read
read headings
photocopy books
lists
timetable
charts
pegword system
acronyms
writing formulas
worked examples
reading before sleep
test themselves
number main points
learn in 3s ask tutors what exam qu's will come up
learn lists of names and dates
pseudoessays
active reading with info
PQR checking correct
association of names and dates
memory

APPENDIX: 6

PILOT QUESTIONNAIRE
ANOVA Tables: Year of study by study skill types

		Sum of squares	df	Mean square	F	p
Do you plan study beforehand? (exam)	Between Groups	2.673	2	1.336	0.591	0.556
	Within Groups	212.487	94	2.261		
	Total	215.160	96			

		Sum of squares	df	Mean square	F	p
Do you plan study beforehand? (coursework)	Between Groups	2.123	2	1.061	0.419	0.659
	Within Groups	250.831	99	2.534		
	Total	252.953	101			

		Sum of squares	df	Mean square	F	p
Do you do essential reading? (exam)	Between Groups	2.603	2	1.302	0.577	0.564
	Within Groups	203.144	90	2.257		
	Total	205.747	92			

		Sum of squares	df	Mean square	F	p
Do you do essential reading? (coursework)	Between Groups	1.609	2	0.804	0.275	0.760
	Within Groups	286.783	98	2.926		
	Total	288.371	100			

		Sum of squares	df	Mean square	F	p
Do you highlight key information? (exam)	Between Groups	1.112	2	0.556	0.164	0.849
	Within Groups	305.377	90	3.393		
	Total	306.489	92			

		Sum of squares	df	Mean square	F	p
Do you highlight key information? (coursework)	Between Groups	3.324	2	1.662	0.511	0.602
	Within Groups	325.438	100	3.254		
	Total	328.762	102			

		Sum of squares	df	Mean square	F	p
Do you use repetition? (exam)	Between Groups	1.902	2	0.951	0.292	0.747
	Within Groups	289.737	89	3.255		
	Total	291.639	91			

		Sum of squares	df	Mean square	F	p
	Between Groups	1.584	2	0.792	0.240	0.787
you use repetition?	Within Groups	326.163	99	3.295		
ursework)	Total	327.748	101			

		Sum of squares	df	Mean square	F	p
	Between Groups	0.981	2	0.490	0.219	0.804
you skim read	Within Groups	203.977	91	2.242		
es? (exam)	Total	204.957	93			

		Sum of squares	df	Mean square	F	p
you skim read	Between Groups	10.287	2	5.143	2.219	0.114
es?	Within Groups	231.743	100	2.317		
ursework)	Total	242.029	102			

		Sum of squares	df	Mean square	F	p
you read	Between Groups	2.688	2	1.344	0.485	0.617
ensively?	Within Groups	251.921	91	2.768		
am)	Total	254.609	93			

		Sum of squares	df	Mean square	F	p
you read	Between Groups	6.255	2	3.127	1.035	0.359
ensively?	Within Groups	302.046	100	3.020		
ursework)	Total	308.301	102			

		Sum of squares	df	Mean square	F	p
you look at past	Between Groups	3.939	2	1.969	0.516	0.599
am papers?	Within Groups	343.464	90	3.816		
am only)	Total	347.403	92			

		Sum of squares	df	Mean square	F	p
	Between Groups	22.067	2	11.033	2.666	0.075
you use charts and	Within Groups	368.400	89	4.139		
grams? (exam)	Total	390.467	91			

		Sum of squares	df	Mean square	F	p
you use charts and	Between Groups	10.386	2	5.193	1.226	0.298
grams?	Within Groups	419.244	99	4.235		
ursework)	Total	429.630	101			

PILOT QUESTIONNAIRE

ANOVA Tables: Year of study by motivation variables

		Sum of squares	df	Mean square	F	p
Agency	Between Groups	11.500	2	5.750	5.269	0.007
	Within Groups	108.033	99	1.091		
	Total	119.532	101			

		Sum of squares	df	Mean square	F	p
Pathways	Between Groups	9.899	2	4.949	3.965	0.022
	Within Groups	123.584	99	1.248		
	Total	133.483	101			

		Sum of squares	df	Mean square	F	p
Hope	Between Groups	10.219	2	5.109	5.048	0.008
	Within Groups	99.199	98	1.012		
	Total	109.417	100			

		Sum of squares	df	Mean square	F	p
Extrinsic Motivation	Between Groups	3.292	2	1.646	0.514	0.600
	Within Groups	320.378	100	3.204		
	Total	323.670	102			

		Sum of squares	df	Mean square	F	p
Intrinsic Motivation	Between Groups	18.421	2	9.210	5.771	0.004
	Within Groups	156.411	98	1.596		
	Total	174.832	100			

		Sum of squares	df	Mean square	F	p
Non-attendance at lectures	Between Groups	12.971	2	6.485	2.164	0.120
	Within Groups	299.631	100	2.996		
	Total	312.602	102			

		Sum of squares	df	Mean square	F	p
Hours	Between Groups	18.111	2	9.056	2.495	0.088
	Within Groups	362.996	100	3.630		
	Total	381.107	102			

LOT QUESTIONNAIRE

NOVA Tables: Path of Study by study skill types

		Sum of squares	df	Mean square	F	p
you plan study	Between Groups	2.104	2	1.052	0.466	0.629
forehand?	Within Groups	212.273	94	2.258		
xam)	Total	214.376	96			

		Sum of squares	df	Mean square	F	p
you plan study	Between Groups	0.357	2	0.179	0.071	0.932
forehand?	Within Groups	250.773	99	2.533		
oursework)	Total	251.130	101			

		Sum of squares	df	Mean square	F	p
	Between Groups	3.623	2	1.811	0.819	0.444
you do essential	Within Groups	199.060	90	2.212		
ading? (exam)	Total	202.683	92			

		Sum of squares	df	Mean square	F	p
you do essential	Between Groups	5.095	2	2.548	0.886	0.416
ading?	Within Groups	281.890	98	2.876		
oursework)	Total	286.985	100			

		Sum of squares	df	Mean square	F	p
you highlight key	Between Groups	7.687	2	3.843	1.171	0.315
ormation?	Within Groups	295.480	90	3.283		
xam)	Total	303.167	92			

		Sum of squares	df	Mean square	F	p
you highlight key	Between Groups	5.664	2	2.832	0.876	0.419
ormation?	Within Groups	323.098	100	3.231		
oursework)	Total	328.762	102			

		Sum of squares	df	Mean square	F	p
	Between Groups	2.119	2	1.060	0.326	0.723
you use repetition?	Within Groups	289.519	89	3.253		
xam)	Total	291.639	91			

		Sum of squares	df	Mean square	F	p
Do you use repetition? (coursework)	Between Groups	0.025	2	0.012	0.004	0.996
	Within Groups	327.664	99	3.310		
	Total	327.689	101			

		Sum of squares	df	Mean square	F	p
Do you skim read notes? (exam)	Between Groups	3.308	2	1.654	0.743	0.479
	Within Groups	202.596	91	2.226		
	Total	205.904	93			

		Sum of squares	df	Mean square	F	p
Do you skim read notes? (coursework)	Between Groups	2.132	2	1.066	0.450	0.639
	Within Groups	237.082	100	2.371		
	Total	239.214	102			

		Sum of squares	df	Mean square	F	p
Do you read intensively? (exam)	Between Groups	4.425	2	2.213	0.800	0.453
	Within Groups	251.780	91	2.767		
	Total	256.205	93			

		Sum of squares	df	Mean square	F	p
Do you read intensively? (coursework)	Between Groups	2.143	2	1.072	0.352	0.704
	Within Groups	304.789	100	3.048		
	Total	306.932	102			

		Sum of squares	df	Mean square	F	p
Do you look at past exam papers? (exam only)	Between Groups	10.858	2	5.429	1.452	0.240
	Within Groups	336.546	90	3.739		
	Total	347.403	92			

		Sum of squares	df	Mean square	F	p
Do you use charts and diagrams? (exam)	Between Groups	7.350	2	3.675	0.861	0.426
	Within Groups	379.955	89	4.269		
	Total	387.304	91			

		Sum of squares	df	Mean square	F	p
Do you use charts and diagrams? (coursework)	Between Groups	4.224	2	2.112	0.492	0.613
	Within Groups	425.406	99	4.297		
	Total	429.630	101			

LOT QUESTIONNAIRE

NOVA Tables: Path of Study by motivation varaibles

		Sum of squares	df	Mean square	F	p
gency	Between Groups	0.572	2	0.286	0.235	0.791
	Within Groups	120.607	99	1.218		
	Total	121.180	101			

		Sum of squares	df	Mean square	F	p
thways	Between Groups	0.576	2	0.288	0.212	0.809
	Within Groups	134.378	99	1.357		
	Total	134.954	101			

		Sum of squares	df	Mean square	F	p
pe	Between Groups	0.502	2	0.251	0.223	0.801
	Within Groups	110.520	98	1.128		
	Total	111.022	100			

		Sum of squares	df	Mean square	F	p
trinsic	Between Groups	7.314	2	3.657	1.147	0.322
tivation	Within Groups	318.744	100	3.187		
	Total	326.058	102			

		Sum of squares	df	Mean square	F	p
rinsic	Between Groups	1.542	2	0.771	0.436	0.648
tivation	Within Groups	173.290	98	1.768		
	Total	174.832	100			

		Sum of squares	df	Mean square	F	p
n-attendance	Between Groups	0.072	2	0.036	0.011	0.989
lectures	Within Groups	313.307	100	3.133		
	Total	313.379	102			

		Sum of squares	df	Mean square	F	p
urs	Between Groups	2.963	2	1.481	0.392	0.677
	Within Groups	378.144	100	3.781		
	Total	381.107	102			

APPENDIX 7

Study Skills Questionnaire

If you will complete this questionnaire your help will be much appreciated.

Please be assured that your responses will be confidential and pooled anonymously with those from many others and will be used only for academic purposes related to this study.

There is a possibility that we may conduct a follow up study in the future which may involve a 2 minute questionnaire or study skills training (optional). If you do NOT wish to be contacted about further research about study skills please indicate here ☐

Please be advised that you may leave the investigation at any time for any reason.

Please note there is an appendix which explains terms which you may find unfamiliar.

tudent No: | | | | | | | | | |

ge: | | | Year of Study: 1 ☐ 2 ☐ 3 ☐ Postgraduate ☐

lease tick only ONE of the following:

ave you continued your education without a break from school to university? ☐
ave you taken a year out? ☐
e you a mature student (i.e. over 21 at the beginning of your course)? ☐

hat is your main subject of study? | |

irections: Read each item carefully. Using the scale below, please select the response at best describes YOU. Please put an ☒ in the appropriate box. Please give information r both exam and coursework.

	EXAM	COURSEWORK
o you read textbooks?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you use the library?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you read journals?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you use the Internet to assist ur study?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you discuss ideas with friends people on your course?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you do recommended ading?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you skim read?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you preview material focusing headings, diagrams, tables, apter reviews and summaries?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you read intensively, paying ention to detail?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you verbally rehearse aterial?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you take lecture notes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
o you rewrite lecture notes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always

	EXAM	COURSEWORK
Do you use lecture notes after writing them?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Alwa
Do you make notes from books / journals?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you categorise your notes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you summarise your notes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you condense notes into their simplest form (such as key words or onto cue cards)?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you keep your notes organised in folders?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you catch up on any notes missed?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use bullet points / numbering?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use three or more colours in your notes or diagrams?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use highlighting?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use underlining?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use images in your notes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use symbols in your notes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use repetition of notes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you make spider diagrams?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you make wall charts to help you remember material?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use graphs?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw
Do you use Mind Maps / knowledge maps / concept maps?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ Alw

	EXAM	COURSEWORK
Do you make diagrams which show connections between concepts (using arrows, lines, etc)?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you organise spacing in diagrams?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you learn things in threes?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you use memory walks? (see appendix 1 for explanation)	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you use a peg word system? (see appendix 2 for explanation)	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you use the first letters of words as a memory aid? (see appendix 3 for example)	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you rehearse information mentally?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you formulate arguments for and against the author's views?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you try to form your own opinions on key issues?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you question spot? (i.e. guess which questions will come up on the exam and mainly revise those areas)	Never 1 ☐☐☐☐☐☐☐ 7 Always	
Do you pose questions for yourself?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you test yourself?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you plan your study beforehand? (e.g. timetable)	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you make essay plans before writing?	Never 1 ☐☐☐☐☐☐☐ 7 Always	Never 1 ☐☐☐☐☐☐☐ 7 Always
Do you use past exam papers?	Never 1 ☐☐☐☐☐☐☐ 7 Always	

Please indicate [X] which of the following statements applies to you using the following scale.

1 = Definitely False ***7 = Definitely True***

	Definitely False (1)						Definitely True (7)
I am keen to get a good mark for my final degree	☐	☐	☐	☐	☐	☐	☐
I am motivated by other peoples' expectations rather than my own	☐	☐	☐	☐	☐	☐	☐
I am determined to work hard in my study to achieve my desired outcomes / career aspirations	☐	☐	☐	☐	☐	☐	☐
Even if the course is difficult I find a way to succeed	☐	☐	☐	☐	☐	☐	☐
For each module I put as much effort in as possible	☐	☐	☐	☐	☐	☐	☐
I think of a lot of ways to make good grades	☐	☐	☐	☐	☐	☐	☐
I need to achieve goals for myself more than anyone else	☐	☐	☐	☐	☐	☐	☐
I nearly always get the grades I want in my academic work	☐	☐	☐	☐	☐	☐	☐
There are lots of ways to meet the challenges of my modules	☐	☐	☐	☐	☐	☐	☐
I very rarely miss lectures	☐	☐	☐	☐	☐	☐	☐

I spend approximately ☐☐ hours per week on independent learning

Please indicate which of the following statements applies to you using the scale belo
Please select ONE response for each statement.

	I begin working on coursework	I begin revising for exam
As soon as the work is set	☐	☐
A month before	☐	☐
A fortnight before	☐	☐
A week before	☐	☐
Two or three days before	☐	☐
The night before	☐	☐

Appendix

1. The memory walk

This is a method of remembering a list of words or ideas by mentally 'placing' them along a familiar route (such as through your house, or along your street). To recall the ideas simply walk along this imagined route simply 'picking up' things as you pass them.

2. The peg word system

One of the most popular peg word systems is the 'one is bun' system. The numbers 1 to 10 are rhymed for example:
one – bun
two - shoe
three - tree
four - door

Then the words to be remembered are turned into mental images and are then associated with the rhymed word (bun, or shoe)

So, if the first word was 'happy' you could imagine a bun with a smiley face. Similarly if the second word was carrot, you could imagine a carrot growing out of a shoe. Bizarre images are often more memorable.

3. Using the first letter of words as a memory aid

Example
Colours of the rainbow

Red	Richard
Orange	Of
Yellow	York
Green	Gave
Blue	Battle
Indigo	In
Vain	Vain

APPENDIX: 8

The frequencies, means and standard deviations of "Deep" study skills

	Study Skill		0	1	2	3	4	5	6	Mean	SD
5	Do you discuss ideas with friends or people on your course?	exam	26	50	46	96	186	196	225	4.25	1.63
5	Do you discuss ideas with friends or people on your course?	coursework	11	28	37	95	144	226	289	4.61	1.45
9	Do you read intensively paying attention to detail?	exam	16	78	121	209	218	108	75	3.40	1.46
9	Do you read intensively paying attention to detail?	coursework	9	58	97	184	228	157	97	3.71	1.44
16	Do you summarise your notes?	exam	109	78	83	145	132	109	124	3.20	1.97
16	Do you summarise your notes?	coursework	127	84	97	170	135	104	73	2.89	1.88
38	Do you formulate arguments for and against the authors views?	exam	85	66	85	175	153	125	133	3.40	1.86
38	Do you formulate arguments for and against the authors views?	coursework	74	56	74	145	147	153	177	3.70	1.88
39	Do you try to form your own opinions on key issues?	exam	34	28	83	140	167	177	190	4.04	1.64
39	Do you try to form your own opinions on key issues?	coursework	32	24	56	139	146	201	227	4.25	1.62
41	Do you pose questions for yourself?	exam	98	70	103	197	159	114	82	3.12	1.78
41	Do you pose questions for yourself?	coursework	151	128	104	174	134	76	56	2.56	1.83
42	Do you test yourself?	exam	38	35	54	107	156	197	236	4.24	1.69
42	Do you test yourself?	coursework	130	87	115	148	130	114	101	2.98	1.95

The frequencies, means and standard deviations of "Surface" study skills

Study Skill			0	1	2	3	4	5	6	Mean	SD
7	Do you skim read?	exam	40	68	75	185	219	146	89	3.54	1.59
7	Do you skim read?	coursework	45	65	79	173	212	161	88	3.55	1.61
10	Do you verbally rehearse material?	exam	145	98	92	127	125	122	114	2.99	2.04
10	Do you verbally rehearse material?	coursework	160	129	98	141	122	102	77	2.66	1.96
12	Do you rewrite lecture notes?	exam	189	81	69	117	128	110	120	2.89	2.14
12	Do you rewrite lecture notes?	coursework	201	97	70	138	108	110	106	2.73	2.12
22	Do you use highlighting?	exam	98	47	62	110	142	138	223	3.78	2.02
22	Do you use highlighting?	coursework	103	53	57	125	144	137	209	3.69	2.02
23	Do you use underlining?	exam	57	29	39	113	152	175	249	4.21	1.78
23	Do you use underlining?	coursework	60	30	36	121	138	184	250	4.20	1.80
26	Do you use repetition of notes?	exam	124	92	104	188	146	88	71	2.85	1.83
26	Do you use repetition of notes?	coursework	150	125	120	212	121	67	26	2.41	1.68
37	Do your rehearse information mentally?	exam	38	23	59	114	150	175	259	4.29	1.68
37	Do your rehearse information mentally?	coursework	99	56	97	176	132	123	143	3.36	1.91

The frequencies, means and standard deviations of "Strategic" study skills

	Study Skill		0	1	2	3	4	5	6		Mean	SD
8	Do you preview material focusing on headings, diagrams, tables, chapter reviews and summaries?	exam	45	59	104	253	168	116	71		3.31	1.54
8	Do you preview material focusing on headings, diagrams, tables, chapter reviews and summaries?	coursework	40	51	83	230	175	150	93		3.55	1.57
15	Do you categorise your notes?	exam	121	71	88	160	121	108	150		3.24	2.01
15	Do you categorise your notes?	coursework	128	68	75	162	137	112	144		3.24	2.01
18	Do you keep your notes organised in folders?	exam	35	17	40	58	89	126	453		4.86	1.66
18	Do you keep your notes organised in folders?	coursework	30	24	39	67	78	120	465		4.87	1.67
40	Do you question spot (I.e. guess which questions will come up on the exam and mainly revise those areas)?	exam	78	84	94	166	156	133	114		3.32	1.83
43	Do you plan your study beforehand (e.g. timetable)?	exam	83	78	92	151	133	137	141		3.41	1.91
43	Do you plan your study beforehand (e.g. timetable)?	coursework	100	82	104	165	129	109	128		3.20	1.92
44	Do you make essay plans before writing?	exam	71	33	72	98	129	134	281		4.09	1.94
44	Do you make essay plans before writing?	coursework	62	25	62	85	116	158	319		4.32	1.87
45	Do you use past exam papers?	exam	51	40	82	155	146	138	211		3.90	1.79

The frequencies, means and standard deviations of "mind map relevant" study skills

	Study Skill		0	1	2	3	4	5	6	Mean	SD
17	Do you condense notes into their simplest form (such as key words or onto cue cards)?	exam	145	82	78	103	107	145	160	3.24	2.15
17	Do you condense notes into their simplest form (such as key words or onto cue cards)?	coursework	196	101	132	151	112	77	57	2.41	1.89
20	Do you use bullet points or numbering?	exam	41	29	44	82	160	210	253	4.36	1.67
20	Do you use bullet points or numbering?	coursework	47	43	46	108	154	193	235	4.18	1.75
21	Do you use three or more colours in your notes and diagrams?	exam	248	95	86	108	105	77	98	2.43	2.14
21	Do you use three or more colours in your notes and diagrams?	coursework	262	106	80	128	104	69	78	2.27	2.06
24	Do you use images in your notes?	exam	209	105	87	155	125	66	58	2.39	1.93
24	Do you use images in your notes?	coursework	215	101	88	166	112	70	64	2.40	1.95
25	Do you use symbols in your notes?	exam	156	99	99	142	129	97	94	2.80	1.99
25	Do you use symbols in your notes?	coursework	159	110	85	144	129	106	89	2.79	2.00
27	Do you make spider diagrams?	exam	157	103	84	144	120	121	81	2.81	1.99
27	Do you make spider diagrams?	coursework	189	104	85	148	125	102	63	2.58	1.97
28	Do you make wall charts to help you remember material?	exam	354	105	89	90	81	63	32	1.70	1.90
28	Do you make wall charts to help you remember material?	coursework	422	127	76	97	55	26	22	1.28	1.67
30	Do you use mind maps / knowledge maps / concept maps?	exam	330	101	97	122	68	53	44	1.79	1.91
30	Do you use mind maps / knowledge maps / concept maps?	coursework	363	126	84	116	58	39	33	1.55	1.80
31	Do you make diagrams which show connections between concepts (using arrows, lines etc)?	exam	96	49	75	142	166	159	131	3.51	1.89
31	Do you make diagrams which show connections between concepts (using arrows, lines etc)?	coursework	107	55	86	140	151	162	124	3.40	1.92
32	Do you organise spacing in diagrams?	exam	162	94	95	171	133	93	68	2.70	1.91
32	Do you organise spacing in diagrams?	coursework	177	89	87	160	144	92	75	2.71	1.96

The frequencies, means and standard deviations of "Mnemonic" study skills

Study Skill				0	1	2	3	4	5	6		Mean	SD
33	exam	Do you use things in threes?	exam	375	144	98	116	46	22	11		1.29	1.53
33	coursework	Do you use things in threes?	coursework	401	147	83	122	35	18	12		1.20	1.50
34	exam	Do you use memory walks?	exam	549	88	43	50	49	19	14		0.86	1.52
34	coursework	Do you use memory walks?	coursework	564	89	45	56	34	16	13		0.78	1.44
35	exam	Do you use a peg word system?	exam	583	85	43	57	22	16	11		0.71	1.36
35	coursework	Do you use a peg word system?	coursework	611	69	35	55	31	11	7		0.64	1.30
36	exam	Do you use the first letters of words as a memory aid?	exam	292	104	59	114	92	84	71		2.18	2.11
36	coursework	Do you use the first letters of words as a memory aid?	coursework	392	101	69	108	75	45	35		1.57	1.87

The frequencies, means and standard deviations of the other study skills

Study Skill			0	1	2	3	4	5	6		Mean	SD
1	Do you read textbooks?	exam	3	12	25	94	122	192	384		4.92	1.28
1	Do you read textbooks?	coursework	16	38	72	162	197	143	199		4.07	1.55
2	Do you use the library?	exam	13	46	88	126	157	151	247		4.18	1.63
2	Do you use the library?	coursework	3	20	22	67	113	184	421		5.02	1.30
3	Do you read journals?	exam	243	156	117	115	86	40	58		2.00	1.88
3	Do you read journals?	coursework	151	91	80	123	126	116	132		3.05	2.09
4	Do you use the Internet to assist your study?	exam	21	36	39	106	153	197	273		4.44	1.58
4	Do you use the Internet to assist your study?	coursework	87	75	79	132	170	127	146		3.46	1.91
6	Do you do recommended reading?	exam	18	52	63	162	205	138	186		3.99	1.58
6	Do you do recommended reading?	coursework	10	32	49	125	202	179	234		4.35	1.47
13	Do you use lecture notes after taking them?	exam	15	17	25	74	144	186	362		4.82	1.42
13	Do you use lecture notes after taking them?	coursework	17	22	42	88	144	204	312		4.63	1.49
14	Do you make notes from books / journals?	exam	32	39	66	113	196	189	185		4.08	1.63
14	Do you make notes from books / journals?	coursework	18	20	49	88	154	208	292		4.57	1.50
19	Do you catch up on any notes missed?	exam	24	18	47	97	107	146	377		4.69	1.61
19	Do you catch up on any notes missed?	coursework	26	21	42	97	109	148	382		4.68	1.62
29	Do you use graphs?	exam	289	103	96	142	120	48	20		1.91	1.79
29	Do you use graphs?	coursework	275	92	83	139	118	75	42		2.15	1.95

APPENDIX: 9

Study Skill Questionnaire
ANOVA Tables: Year of study by study skill types

		Sum of squares	df	Mean square	F	p
Deep exam	Between Groups	8.637	2	4.318	4.151	0.016
	Within Groups	785.403	755	1.040		
	Total	794.039	757			

		Sum of squares	df	Mean square	F	p
Deep coursework	Between Groups	2.757	2	1.378	1.479	0.229
	Within Groups	703.580	755	0.932		
	Total	706.337	757			

		Sum of squares	df	Mean square	F	p
Surface exam	Between Groups	9.380	2	4.690	0.043	0.958
	Within Groups	830.982	768	1.082		
	Total	831.076	770			

		Sum of squares	df	Mean square	F	p
Surface coursework	Between Groups	7.449	2	3.724	3.762	0.024
	Within Groups	769.307	777	0.990		
	Total	776.756	779			

		Sum of squares	df	Mean square	F	p
Strategic exam	Between Groups	10.850	2	5.425	5.653	0.004
	Within Groups	736.021	767	0.960		
	Total	746.871	769			

		Sum of squares	df	Mean square	F	p
Strategic coursework	Between Groups	3.997	2	1.998	1.640	0.195
	Within Groups	947.784	778	1.218		
	Total	951.781	780			

tudy Skill Questionnaire

NOVA Tables: Year of study by motivation varaibles

		Sum of squares	df	Mean square	F	p
gency	Between Groups	3.869	2	1.935	2.680	0.069
	Within Groups	581.775	806	0.722		
	Total	585.644	808			

		Sum of squares	df	Mean square	F	p
athways	Between Groups	5.659	2	2.830	3.322	0.037
	Within Groups	684.943	804	0.852		
	Total	690.602	806			

		Sum of squares	df	Mean square	F	p
ope	Between Groups	4.525	2	2.262	3.478	0.031
	Within Groups	519.811	799	0.651		
	Total	524.336	801			

		Sum of squares	df	Mean square	F	p
trinsic	Between Groups	2.204	2	1.102	0.565	0.569
otivation	Within Groups	1577.648	809	1.950		
	Total	1579.852	811			

		Sum of squares	df	Mean square	F	p
xtrinsic	Between Groups	1.907	2	0.953	0.326	0.722
otivation	Within Groups	2383.836	814	2.929		
	Total	2385.743	816			

		Sum of squares	df	Mean square	F	p
on-attendance	Between Groups	0.859	2	0.429	0.206	0.814
lectures	Within Groups	1692.581	813	2.082		
	Total	1693.440	815			

		Sum of squares	df	Mean square	F	p
ours	Between Groups	4717.771	2	2358.885	33.506	0.000
	Within Groups	53504.685	760	70.401		
	Total	58222.456	762			

Study Skill Questionnaire

ANOVA Tables: Status by study skill types

		Sum of squares	df	Mean square	F	p
Deep exam	Between Groups	0.544	2	0.272	0.258	0.773
	Within Groups	787.212	746	1.055		
	Total	787.756	748			

		Sum of squares	df	Mean square	F	p
Deep coursework	Between Groups	0.736	2	0.368	0.393	0.675
	Within Groups	698.966	746	0.937		
	Total	699.702	748			

		Sum of squares	df	Mean square	F	p
Surface exam	Between Groups	1.216	2	0.608	0.564	0.569
	Within Groups	818.882	759	1.079		
	Total	820.098	761			

		Sum of squares	df	Mean square	F	p
Surface coursework	Between Groups	0.323	2	0.162	0.162	0.851
	Within Groups	766.336	768	0.998		
	Total	766.659	770			

		Sum of squares	df	Mean square	F	p
Strategic exam	Between Groups	5.375	2	2.688	2.806	0.061
	Within Groups	727.092	759	0.958		
	Total	732.467	761			

		Sum of squares	df	Mean square	F	p
Strategic coursework	Between Groups	3.212	2	1.606	1.344	0.261
	Within Groups	919.048	769	1.195		
	Total	922.260	771			

tudy Skill Questionnaire

NOVA Tables: Status by motivation varaibles

		Sum of squares	df	Mean square	F	p
gency	Between Groups	3.498	2	1.749	2.467	0.085
	Within Groups	564.914	797	0.709		
	Total	568.412	799			

		Sum of squares	df	Mean square	F	p
athways	Between Groups	3.411	2	1.705	2.016	0.134
	Within Groups	672.625	795	0.846		
	Total	676.036	797			

		Sum of squares	df	Mean square	F	p
ope	Between Groups	3.983	2	1.992	3.097	0.046
	Within Groups	508.008	790	0.643		
	Total	511.991	792			

		Sum of squares	df	Mean square	F	p
trinsic otivation	Between Groups	14.634	2	7.317	3.804	0.023
	Within Groups	1538.910	800	1.924		
	Total	1553.544	802			

		Sum of squares	df	Mean square	F	p
trinsic otivation	Between Groups	51.426	2	25.713	9.055	0.000
	Within Groups	2285.842	805	2.840		
	Total	2337.267	807			

		Sum of squares	df	Mean square	F	p
n-attendance lectures	Between Groups	0.422	2	0.211	0.102	0.903
	Within Groups	1661.372	804	2.066		
	Total	1661.794	806			

		Sum of squares	df	Mean square	F	p
urs	Between Groups	1443.995	2	721.997	9.770	0.000
	Within Groups	55575.110	752	73.903		
	Total	57019.105	754			

Study Skill Questionnaire

ANOVA Tables: Main Subject by study skill types

		Sum of squares	df	Mean square	F	p
Deep exam	Between Groups	11.111	4	2.778	3.165	0.014
	Within Groups	459.887	524	0.878		
	Total	470.998	528			

		Sum of squares	df	Mean square	F	p
Deep coursework	Between Groups	9.626	4	2.407	2.813	0.025
	Within Groups	443.204	518	0.856		
	Total	452.830	522			

		Sum of squares	df	Mean square	F	p
Surface exam	Between Groups	26.759	4	6.690	7.256	0.000
	Within Groups	491.403	533	0.922		
	Total	518.162	537			

		Sum of squares	df	Mean square	F	p
Surface coursework	Between Groups	4.955	4	1.239	1.343	0.253
	Within Groups	499.071	541	0.922		
	Total	504.026	545			

		Sum of squares	df	Mean square	F	p
Strategic exam	Between Groups	30.999	4	7.750	9.240	0.000
	Within Groups	444.518	530	0.839		
	Total	475.517	534			

		Sum of squares	df	Mean square	F	p
Strategic coursework	Between Groups	20.619	4	5.155	4.725	0.001
	Within Groups	585.85	537	1.091		
	Total	606.469	541			

Study Skill Questionnaire

ANOVA Tables: Main subject by motivation varaibles

		Sum of squares	df	Mean square	F	p
Agency	Between Groups	3.983	4	0.996	1.526	0.193
	Within Groups	364.084	558	0.652		
	Total	368.067	562			

		Sum of squares	df	Mean square	F	p
Pathways	Between Groups	1.399	4	0.350	0.440	0.779
	Within Groups	441.705	556	0.794		
	Total	443.104	560			

		Sum of squares	df	Mean square	F	p
Hope	Between Groups	1.571	4	0.393	0.645	0.630
	Within Groups	336.537	553	0.609		
	Total	338.108	557			

		Sum of squares	df	Mean square	F	p
Intrinsic Motivation	Between Groups	0.829	4	0.207	0.111	0.979
	Within Groups	1040.808	559	1.862		
	Total	1041.637	563			

		Sum of squares	df	Mean square	F	p
Extrinsic Motivation	Between Groups	0.772	4	0.193	0.065	0.992
	Within Groups	1666.325	563	2.960		
	Total	1667.097	567			

		Sum of squares	df	Mean square	F	p
Non-attendance lectures	Between Groups	9.703	4	2.426	1.320	0.261
	Within Groups	1034.692	563	1.838		
	Total	1044.394	567			

		Sum of squares	df	Mean square	F	p
hours	Between Groups	1632.138	4	408.035	6.808	0.000
	Within Groups	31647.014	528	59.938		
	Total	33279.152	532			

APPENDIX: 10

Subject of study

A breakdown of the classification of whether subjects are classed as Arts or Science in the study

Subject	**Classification**
Maths	Science
Biology	Science
History	Art
Psychology	Science
Business	Science
English	Art
Languages	Art
Art	Art
Drama	Art
Theology	Art
Geography	Science
P.E. and Sports Science	Science
Computer Science	Science

APPENDIX II

Consent form

Thank you for volunteering to participate in this study. The area we are investigating is study skills. Please be assured that your responses will be confidential and pooled anonymously with those in the study, and will be used only for academic purposes related to the study. Please be advised that you are free to leave at anytime for any reason.

Print Name: ----------

Date: ----------

Sign Name :----------

APPENDIX 12.

Explaining Crime

There is a long and uneven tradition of claims that the origins of crime and deviance are biological. In the nineteenth century it was claimed, for example, that brain sizes and skull shapes could explain criminal behaviour. This kind of crude biological determinism has long been discredited, but it gave way to a subtler and notionally, scientific model of genetic determinism. In the early 20th century advocates of eugenics claimed to have created the science of improving humanity. They argued that social behaviour could not only be studied with the methods of natural science, but that a social science which modelled itself on the natural sciences could, as medicine discovers the pathological causes of illness, discover the pathological causes of crime. According to eugenicists of the time, certain groups of people-variously, the poor, aliens and foreigners, the mentally ill, disabled and criminals- possessed incurable genetic defects. These defective and dangerous people threatened the genetic purity, and the moral values and fibre of the social order. Moreover, eugenicists worried, these groups were likely to reproduce more defective and dangerous people. Taken to there extremes, these arguments underwrote programs of sterilisation of the mentally ill and of criminals all over Europe; most enthusiastically by the Nazi regime.

While eugenics has long been discredited, biological and genetic arguments continued to resurface in criminological debates. The new genetic determinism of the late 20th century is backed up by a much more explicit biological understanding of what genes actually are. Genes are particular parts or segments of the DNA strands that sit in the nucleus of every living cell. Genes are in effect biochemical codes that, through a variety of mechanisms, control and shape the development and operation of cells and thus in turn whole organisms. Moreover, when cells divide their DNA passes on to the new cells. When organisms sexually reproduce, the DNA of both parents is combined and transferred to their offspring. The new genetics argues that many patterns of human behaviour can be traced back to the individual's genetic endowment or their inherited genetic and biological structures.

Probably the most rigorous research in this tradition has been associated with the study of twins and of adopted children. There is a large body of research which suggests that identical twins, when compared with non-identical twins, are much more likely to display similar tastes, talents and patterns of behaviour, not least known criminal offending (Christiansen, 1977). (Identical twins share the same genetic make-up as opposed to non-identical twins who share a womb, but possess different genes.) However, it has been widely noted that identical twins are treated by their families and their schools as much more alike than non-identical twins. Therefore, their criminal behaviour may be largely explained by their shared social experiences rather than their shared genetic endowments.

According to the leading exponent of genetic explanations of criminality, Sarnof Mednick, the study adoptions better separates social and genetic effects or structures than twin studies (Mednick *et al*, 1978, p.74). The central proposition of Mednick's research in this area is that adopted children's criminal behaviour is more similar to their biological parents' criminal behaviour than their adoptive parents. On the basis of his analysis of research findings from Denmark, Mednick argues that there is indeed a stronger relationship between the criminality of the adopted child and their

biological parents, than there is between the adopted child and their adoptive parents. This relationship is particularly strong amongst chronic, persistent criminal offenders.

In related research, Mednick and his colleagues have tried to find a more precise biological mechanism that links possession of a certain gene to a biological characteristic of an individual, and in turn how this links to, or structures criminal behaviour. They claim to have discovered a particular pattern of inherited *autonomic nervous system* (ANS) characteristics amongst known offenders. The ANS is the unconscious part of the nervous system connecting the brain to our internal organs, senses, skin and muscles. Mednick argues that criminal offenders tend to have an ANS that is less sensitive to environmental stimuli than non-offenders. This creates personalities and dispositions that are less alertly tuned to the world, slower to respond to external signals and more easily distracted. As a consequence these individuals are less likely to respond to all the social messages and constraints that exist against acting criminally or in an anti-social fashion. In short, they are less likely to be inhibited in displaying anti-social behaviour.

The core explanatory claim seems to be: (a) individuals inherit a particular set of genes which structure and shape their capacity to receive socialising messages; and (b) given this failure, over which they have little control, they are more likely than not to exhibit anti-social or criminal behaviour.

Two problems came to our minds. First, it seems that despite the emphasis on the structural biological and genetic origins of criminal behaviour, Mednick has smuggled social factors back into the explanation. It may be that biology shapes how responsive we are to messages about criminality, but someone, somewhere is creating and transmitting those messages and values. Could it be that criminal behaviour is more closely related to the type of messages that we hear, rather than our biological predisposition for listening and responding? Second, even if Mednick is in some sense right about the origins of individual criminal behaviour, how far does this model of explanation take us in explaining corporate crime (like the discharge of chemicals from an oil refinery)? Do companies have genes?

Feminist Arguments

In contrast to the conservative argument about the 'decline' of the traditional family there are responses, which see the changes in contemporary family life in a much more positive light. Such responses welcome them because they go some way to redress the inequalities of power relations which are seen as deeply embedded in traditional family structures and in which societies in which the 'traditional family' is seen as the norm. This perspective starts from the possibility that the idyll of the traditional nuclear family hides a range of internal divisions, inequalities and asymmetries of power. It suggests that families are, and always have been, not just the source of comfort and support but also the source of oppression for some of their members. Furthermore, this perspective argues that calls for a return to traditional life need to recognise this.

Again there are many different strands of this kind of response but the most influential ones have developed out of feminism. It was feminist critiques of the family emerging in the 1960's and 1970's, from within the developing women's movement, which drew attention to unequal power relations between men and women within the family. Feminism does, of course, encompass a wide range of positions. It is both an academic approach and a political movement. There is no one feminism and, clearly, it has developed and changed since the early days when feminists first wrote of their experiences of family life. But common to all feminist analysis is a critique of patriarchy: that in all spheres of life men have power over women. Although this may not be the case for individual men in relation to individual women, still society as a whole is characterised by unequal power relations. As you will see below, feminists differ in terms of where they locate the sources of this oppression and in particular what role they see the family as playing in creating and maintaining these inequalities. Even for those whose main focus of interest is the family, their approaches and starting points differ. But common to all is recognition that the picture of sharing, companionship, and equality presented by many in the 1950's and 1960's actually masked a situation in which men had power over women. From this broad set of ideas and social values, there is the recognition that the increased diversity and difference evident today is to be welcomed as a step towards greater equality for all family members.

Different strands of feminism explain women's inequality in different ways and the role of the family in these explanations also differs. The main concern for *Marxist feminists*, for example, is with the relationship between women's role in families and the working of a capitalist economic system. The reproduction of the workforce (and by this we mean not just the responsibility for the next generation of workers but also the 'servicing' of the needs of the present generation) is carried out by women in the home at the same time women are available to meet changing demands for labour within the economy. Women's work in the home and as a 'reserve army of labour' is, consequently, for Marxist feminists part of capitalist economic relations; it serves the interests of capitalism. For *radical feminists*, the focus is on the way family life enables men to gain and maintain power over women. It is not capitalist economic structures which are the starting point here but the ubiquitous power structures found in every society, whereby men oppress women and which radical feminists consider the most important division in any society. Structures and distributions of power within the family keep women in a subordinate dependent position in the family. This

oppression is then played out in a range of other spheres including, for example, the arts, politics, and the world of work. *Liberal feminists* certainly recognise the inequalities that exist in family life and the way these are related to a lack of equal opportunities in many spheres outside the family. However, their starting point is the actions and attitudes of individuals or groups of men and women, which are amenable to change through, for example, legislation or educational programmes rather than the structures of capitalism or patriarchy.

Although each different strand of feminism has a different starting point they have similar interest in understanding the lived experience of family life for women and the obstacles it poses to female emancipation. Whilst there is recognition of the ways in which women's lives have changed during the past 40 years, particularly with their increased employment outside the home, feminists argue that marked inequalities still exist both inside and outside the home. They point to the unequal division of labour in the home whereby even women who are working full time may still take the responsibility for all the caring and other domestic work. They also recognise that there is a relationship between the priority given to this domestic role, underpinned as it is by assumptions about women's 'natural' interests and abilities, and women's over-representation in lower-paid part-time work outside the home. Indeed, even if 'private' patriarchy is lessening (an argument which not all would agree with) it is only being replaced by what Sylvia Walby (1991) has called 'public patriarchy'. This is a term used to describe the process whereby women have become employees of the welfare state on a huge scale in paid work characterised by both low status and low pay, and in the same kinds of jobs that they have traditionally done at home (e.g. child care and elder care).

Equally significantly, feminists have played a key role in developing our understanding that the family is not a *natural* but a *social* unit. According to Gittins (1985), for example, people live in a wide variety of different domestic arrangements and the range is so great that what unifies them is not immediately obvious. Furthermore, 'what orators say about the family is frequently very far removed from how men, women and children actually live out their lives' (Gittins, 1985, p.59).

APPENDIX 13

Crime Questions

1. In the text the author refers to 6 groups of people who pose a threat to 'normal' members of society. Name **THREE** of these groups.

2. According to the text these groups of people threaten the:
   a) genetic purity
   b) moral fibre
   c) social order
   d) all of the above

3. The study of eugenics aimed to:
   a) identify criminals according to brain size
   b) identify criminals according to skull shape
   c) improve humanity using social science
   d) all of the above
   e) both a and b

4. According to the text which approach underwrote programmes of sterilisation of criminals and the mentally ill?
   a) the new genetic determinism
   b) social learning theory
   c) eugenics
   d) neurological
   e) both a and c

5. Who was the leading exponent of genetic explanations of criminality?

6. When did the new genetic determinism emerge?
   a) the 19th century
   b) the early 20th century
   c) the mid 20th century
   d) the late 20th century
   e) the late 18th century

7. If identical twins reared separately vary in patterns of criminal behaviour this may be explained by:
   a) parenting
   b) genetic make-up
   c) shared social experiences
   d) both a and b
   e) both a and c

8. What do the initials ANS stand for?

9. What is the final question asked by the author?

10. Mednick found that offenders have an ANS which is ..... compared with non-offenders.
    a) faster
    b) slower
    c) more sensitive
    d) less sensitive
    e) more active

11. Which **TWO** are problems with Mednick's theory proposed by the author?
    a) we do not fully understand how genes operate
    b) explaining corporate crime
    c) decontextualisation
    d) group behaviour
    e) social factors are not explained
    f) there is an overemphasis on physiology
    g) criminality is a socially defined phenomena

12. The most effective twin studies look at criminality of non-identical twins when they have been reared separately?
    True or False

Feminist Questions

1. The types of feminism explained in the text?
    a) radical
    b) liberal
    c) Marxist
    d) All of the above

2. The author argues that the family is a natural and social unit.
   True or False

3. For radical feminists the main focus is on:
    a) family life
    b) power of men over women
    c) the capitalist economy
    d) attitudes and actions
    e) a and b
    f) a and d

4. What was the name of the author who argues that what orators say about the family is frequently far removed from how men, women and children actually live out their lives?

5. Which author uses the term 'public patriarchy'?

6. Which feminist approach sees women's role in the family as reproducing and servicing the workforce?

7. What is described as 'public patriarchy?
    a) men having more power in the public domain rather than in the family
    b) women working in jobs with low pay and status, which are similar to jobs previously done in the home
    c) women taking on high powered jobs which are usually done by men
    d) men 'allowing' women to take jobs as a token for equal opportunities policies
    e) a and d

8. Feminists point out that although women are now undertaking full time work they still take main responsibility for domestic and caring duties.
   True or False

9. Which **TWO** are examples given by liberal feminists as ideas for change?
    a) legislation
    b) equal opportunities in the workplace
    c) men undertaking a greater share of care and domestic duties
    d) career advice for women
    e) educational programmes
    f) financial support given to women's groups
    g) an increase in one parent families

10. Feminists believe that such a wide diversity of ideas and social values reduces equality for all family members.
    True or False

11. With the exception of the family, which examples are given in the text as areas or fields where women are low in power and oppressed? Please give **THREE** examples.

12. In the 19—s and 19—s critiques by feminists drew attention to unequal power relations. Please fill in the blanks using the choices below:
    a) 40s and 50s
    b) 50s and 60s
    c) 60s and 70s
    d) 70s and 80s

APPENDIX 14 MATCHING QUESTIONS.

Feminism	Crime. (worth - mar
1	8 (1)
2	10 (1)
3	4 (1)
4	5 (1)
5	9 (1)
6	12 (1)
7	2 (1)
8	7 (1)
9	11 (2)
10	3 (1)
11	1 (3)
12	6 (1)

Correct Answers

Feminism

1) d.
2) False
3) e
4) Gittins
5) Sylvia Walby
6) Marxist
7) b
8) True
9) a + e
10) False
11) World of work, arts, politics
12) c

Crime

1) Poor, aliens, foreigress, disabled, r
2) d
3) c
4) c
5) Sarnof Mednick
6) d
7) ~~Autonomic Nervous Syste~~
8) Autonomic Nervous Syst
9) Do companies have gene
10) d
11) b + e
12) False

APPENDIX IS

Crime

1

2

3

4

5

6

7

8

9

10

11

12

APPENDIX 16 - PRE-TEST.

Instructions

You will be asked to read a passage of text, please try to learn this to the best of your ability in the time provided using techniques you would **normally** use. Please feel free to write on the text and make notes with the paper and pens provided. After 20 minutes you will be asked a series of questions, please answer as many as possible. Please do not discuss the task with anyone until you have left the room.

T-TEST

Instructions

You will be asked to read a piece of text, please try to learn this to the best of your ability in the time provided using the **Mind Mapping** technique. Please feel free to write on the text and make use of the pens and paper provided.

After 20 minutes you will be asked a series of questions, please answer as many as possible. Please do not discuss the task with anyone until you have left the room.

APPENDIX 17

MIND MAPPING

by

Joanne Shuttleworth

What I plan to cover today

- What is a mind map?
- How can it be used in real life settings?
- How to read a mind map.
- How does it work?
- How to turn a passage of text into a mind map.
- Practice session.

The Mind Map study technique

- Mind Mapping was invented by Tony Buzan.
- It is a technique used for note taking and note making.
- Similar to a spider diagram or knowledge map but not the same.

Step 1

- Create a central word or image.
- This should represent the main topic of study.
  e.g. World Pollution

Step 2

- Add first major branch
- This should contain a keyword representing the topic subheadings.
  (Note: Always start at top right hand corner)

Step 3

- Include other detail using images or words on smaller branches.

Step 4

- Add more detail on increasingly smaller branches.

Step 5

- Fill in the other branches.

Mind Map Laws

- Always use A3 paper – landscape view
- Use colour
- Use images throughout the mind map wherever possible.

Mind Map Laws

- Always use a central image
- Use at least 3 colours in this image
- Connect major branches to central image
- Connect lines to other line in hierarchical order
- Ensure central branches are thicker than connecting branches

Mind Map Laws

- Use only one key word per line
- Ensure writing can be read without moving the map around
- Print all words ensuring they can be read easily
- Make sure all words are on lines equal to the word length

Imagery, Shape and Dimension

- Use as much as possible wherever relevant
- Develop personal style

APPENDIX: 18

Counterbalancing Procedure

To ensure the smooth running of the experiment, participants were allocated into one of eight conditions according to where they were seated. The table below indicates which task participants would be allocated in the 'Pre-test' condition (i.e. self-selected study technique) and the 'Post-test' condition (mind mapping technique).

Condition	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Pre-test	I	K	E	A	I	E	A	K
Post-test	K	I	A	K	E	I	E	A

Key
A = Attachment text
E = Eyewitness text
I = Intelligence text
K = Kohlberg text

This particular order was devised so that each task would be used an equal number of times in the experiment. If one (or even two) of the tasks were not equal to the others then the scores from those conditions can be removed. For example, if the 'Attachment' task was significantly different from the other tasks, then all the scores from conditions 3, 4, 7 and 8 would be eliminated from the experiment. If two conditions were not equal, for example 'Attachment' and 'Kohlberg' then the only conditions remaining in the experiment would be conditions 5 and 6. This means that should this problem occur, some of the data is still valid.

It is worth noting that, if a participant completes a text which the analysis reveals to be unequal, then the scores from both the 'pre-test' and the 'post-test' condition would need to be eliminated from the results. Due to the within subjects nature of the design, if bias occurs in just one of the tasks, all of the scores from the participants completing that task must be removed.

APPENDIX 19

Name: Student No:

Age: Year of Study: 1 2 3

Please tick only ONE of the following:

Have you continued your education without a break from school to university?
Have you taken a year out?
Are you a mature student (i.e. over 21 at the beginning of your course)?

Directions: Read each item carefully. Using the scale below, please select the response that best describes YOU (when studying). Please put an [X] in the appropriate box.

Do you skim read?	Never 1 2 3 4 5 6 7 Always
Do you discuss ideas with friends or people on your course?	Never 1 2 3 4 5 6 7 Always
Do you read intensively, paying attention to detail?	Never 1 2 3 4 5 6 7 Always
Do you verbally rehearse material?	Never 1 2 3 4 5 6 7 Always
Do you rewrite lecture notes?	Never 1 2 3 4 5 6 7 Always
Do you summarise your notes?	Never 1 2 3 4 5 6 7 Always
Do you condense notes into their simplest form (e.g. such as key words or onto cue cards)?	Never 1 2 3 4 5 6 7 Always
Do you use three or more colours in your notes or diagrams?	Never 1 2 3 4 5 6 7 Always
Do you use highlighting?	Never 1 2 3 4 5 6 7 Always
Do you use underlining?	Never 1 2 3 4 5 6 7 Always
Do you use images in your notes?	Never 1 2 3 4 5 6 7 Always
Do you use symbols in your notes?	Never 1 2 3 4 5 6 7 Always

13 Do you use repetition of notes?

Never Always
1 ☐☐☐☐☐☐☐ –

14 Do you make spider diagrams?

Never Always
1 ☐☐☐☐☐☐☐ –

15 Do you make wall charts to help you remember material?

Never Always
1 ☐☐☐☐☐☐☐ –

16 Do you use graphs?

Never Always
1 ☐☐☐☐☐☐☐ –

17 Do you use Mind Maps / knowledge maps / concept maps?

Never Always
1 ☐☐☐☐☐☐☐ –

18 Do you make diagrams which show connections between concepts (using arrows, lines, etc)?

Never Always
1 ☐☐☐☐☐☐☐ –

19 Do you organise spacing in diagrams?

Never Always
1 ☐☐☐☐☐☐☐ –

20 Do you rehearse information mentally?

Never Always
1 ☐☐☐☐☐☐☐ –

21 Do you formulate arguments for and against the author's views?

Never Always
1 ☐☐☐☐☐☐☐ –

22 Do you try to form your own opinions on key issues?

Never Always
1 ☐☐☐☐☐☐☐ –

23 Do you pose questions for yourself?

Never Always
1 ☐☐☐☐☐☐☐ –

ease indicate [X] which of the following statements applies to you using the following scale.

1 = Definitely False ***7 = Definitely True***

	Definitely False (1)						Definitely True (7)
keen to get a good mark for my final degree	☐	☐	☐	☐	☐	☐	☐
motivated by other peoples' expectations t than my own	☐	☐	☐	☐	☐	☐	☐
determined to work hard in my study to achieve my d outcomes / career aspirations	☐	☐	☐	☐	☐	☐	☐
if the course is difficult I find a way to succeed	☐	☐	☐	☐	☐	☐	☐
ach module I put as much effort in as possible	☐	☐	☐	☐	☐	☐	☐
of a lot of ways to make good grades	☐	☐	☐	☐	☐	☐	☐
d to achieve goals for myself more than anyone else	☐	☐	☐	☐	☐	☐	☐
ly always get the grades I want in my academic work	☐	☐	☐	☐	☐	☐	☐
are lots of ways to meet the challenges of my les	☐	☐	☐	☐	☐	☐	☐
rarely miss lectures	☐	☐	☐	☐	☐	☐	☐

APPENDIX 20

Attachment

Attachment is the term applied to the intense emotional tie that develops between two individuals, in this case an infant and a parent. Attachment has a clear survival value in that it motivates infants to remain close to their parents or other caregivers who protect them from danger. Infants may establish intense, affectionate, reciprocal relationships with their parents, older siblings, grandparents, or any consistent caregiver. However, the most intense attachment relationship that typically occurs in the early stages of development is between mother and child, and most of the available research has focused on the development of this bond.

Most of the work on attachment in human infants originated with the psychoanalyst John Bowlby in the 1950's and 1960's. His research convinced him that a child's failure to form a secure attachment to one or more persons in the early years is related to an inability to develop close personal relationships in adulthood (Bowlby, 1973).

In an effort to find out more about infants' attachments, developmental psychologist Mary Ainsworth (1979) used a laboratory procedure that she labelled the "strange situation." This procedure consists of a series of episodes in which a child is observed as the primary caregiver leaves and returns to the room, which is also occupied by a stranger who offers comfort if required. Throughout this sequence the baby is observed through a one-way mirror and several observations are recorded: the baby's activity level and play involvement, crying and other distress signs, proximity to and attempts to gain the attention of the mother, proximity and willingness to interact with the stranger, and so on. On the basis of their behaviours babies are categorized into one of three groups:

Securely attached babies, regardless of whether they are upset at the mother's departure, seek to interact with her when she returns. Some are content simply to acknowledge her from a distance while continuing to play with the toys. Others seek physical contact with her. Still others are completely preoccupied with the mother throughout the whole session, showing intense distress when she leaves.
Insecurely attached: avoidant babies avoid interacting with the mother during the reunion episodes. Some ignore her almost entirely; others display mixed attempts to interact and to avoid interacting. Avoidant babies may pay little attention to the mother when she is in the room and often do not seem distressed when she leaves. If they are distressed they are as easily comforted by the stranger as by the mother.
Insecurely attached: ambivalent babies show resistance to the mother during the reunion episodes. They simultaneously seek and resist physical contact. For example, they may cry to be picked up and then squirm angrily to get down. Some behave very passively, crying for the mother when she returns but not crawling towards her, and then showing resistance when she approaches.

What accounts for these differences? The answer probably lies in a combination of two factors: parenting practises and the inborn differences among infants themselves. Researchers have found that the caregiver's "sensitive responsiveness" to the baby's needs produces secure attachment. Mothers of the securely attached babies were inclined to be sensitive and responsive to their babies. They were more likely to cuddle and get involved with the babies play than those mothers of insecurely attached children. Some developmental psychologists disagree that the caregiver's

Eyewitness testimony

The unreliability of testimony in court from those who have been eyewitnesses to an event is well attested. However, juries still seem willing to trust the testimony of eyewitnesses. Perhaps they should be more careful. There are two problems: being able to recognise faces accurately; associated with this, the difficulty of recall of other information relating to an event.

Witnesses to motor accidents are frequently asked to recall the details of what happened. Loftus and Palmer (1974) showed that the wording of a question relating to what a witness had seen could make a substantial difference to the accuracy of testimony.

Participants in their study were shown a film of a multiple car accident. After being asked to describe what happened in their own words they were asked specific questions. These were in three groups: some were asked "About how fast were the cars going when the smashed into each other?" Others were asked, "About how fast were the cars going when they hit each other?" A control group were not asked any questions about the speed of the cars. The first group's mean estimate of the car's speed was 10.5 mph; the second group's estimate was 8.0 mph. The wording of the question had affected the recall of the motor accident. A week later all the participants were asked the question: "Did you see any broken glass?" Even though there was no broken glass shown in the film of the accident, 32 per cent of the first group said there was broken glass, compared to 14 per cent of the second group, and 12 per cent of the control group. Eyewitness evidence is easily distorted by information presented subsequently. The explanation that participants may simply have been responding to the experimental situation, arguing that cars that smash into each other would inevitably produce broken glass, has been refuted by a later experiment.

Several groups of participants in an experiment by Loftus et al. (1978) saw slides of a sports car, which stopped at an intersection and then turned and hit a pedestrian. Of these groups: Group A saw a 'stop' sign at the intersection; Group B saw a 'yield' sign. Twenty minutes to one-week later participants were asked questions about the accident. A critical question contained information, which was either consistent, or inconsistent with the detail of what they had seen on the slides. Alternatively, the detail was not mentioned in the question. For instance, members of the group, which had seen the 'stop' sign, were asked "Did another car pass the red Datsun while it was stopped at the 'yield' sign?" (inconsistent). "Did another car pass the red Datsun while it was stopped at the 'stop' sign?" (consistent). Still other members of the group had a question, which did not include the sign at all. Then they were shown slides, one with a 'stop' sign and one with a 'yield' sign and asked which they had seen. Those who had an inconsistent question tended to choose the information contained in the questionnaire rather than on the original slides. Those who had had a consistent or neutral question produced more correct responses. Later information does influence the responses of eyewitnesses.

New research, however, suggests that there may be a better method of eliciting information from witnesses. This method is called the cognitive interview. Originally conceived by Geiselman et al. (1984) and later refined (Fisher et al., 1987),

Intelligence Tests - A historical sketch

The earliest examples of intelligence tests were provided at the end of the nineteenth century by Sir Francis Galton in England and J. Cattell in America. These early tests, which were based on the measurement of simple sensory processes such as the speed of reaction times and judging the difference between two weights, did not prove useful as measures of intelligence.

Simon-Binet test: The first tests to resemble modern intelligence tests were devised by the French psychologist Alfred Binet and his co-researcher Theodore Simon. In 1905, Binet was requested by the French government to devise tests, which would identify children who needed special educational help. Using the judgements of schoolteachers on what constituted 'average' performance on a range of tasks involving reasoning and judgement; Binet first undertook to identify the 'mental level' of the 'normal' child in various different age groups. From this work, a number of age-related scales were devised based on the other concept of mental age. Thus, a seven-year-old child who satisfactorily completed all those items normally completed by the average eight-year-old was aid to have a mental age of eight; the ten-year-old who was able to complete only those tasks expected of an eight-year-old would also be assigned a mental age of eight. The result of this work was the Simon-Binet (1905) test, which is generally recognised as the first intelligence test.

Intelligence quotient: Later researchers contended that in order for a more complete assessment to be made of the ability levels of children of different age groups who exhibit the same mental age, some account should be taken of the child's chronological, or actual, age. In 1912, Stern introduced the idea of the intelligence quotient (IQ), which could be calculated as follows:

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}} \times 100$$

It can be seen that when the mental age and the chronological age are the same, using this calculation, IQ is 100, which is average. This way of calculating IQ is not used any longer. Today, a child's test performance is compared directly to norms (average scores) drawn from a large group of children of the same age during a standardization process. However, an IQ of 100 is still used as the average score.

Stanford-Binet: in 1916, Lewis Terman of Stanford University revised the Simon-Binet test. The Stanford- Binet test as it became known was originally designed for children but was later extended to measure IQ in adults. The Stanford-Binet Intelligence Scale was revised many times, the most recent revision being in 1986. Before the 1986 revision, the IQ score was derived from an amalgam of all the items and would not reflect differences between a child's performance in, for example, numerical ability compared to verbal ability.

Kohlberg's Theory of Moral Development

Lawrence Kohlberg (1927-87) studied boys of between 10 and 17 years of age, and he studied the same boys over the course of several years. He presented the children with stories involving moral dilemmas. For example, one story described a man called Heinz who wife was dying of a cancer that could only be treated by a medication discovered by a druggist living in the same town. The man could not afford the price demanded by the druggist, so the distraught man broke into the druggist's store and stole enough of the drug to save his wife's life. The boys were asked what Heinz should have done and why he should have done it. On the basis of his research, Kohlberg decided that moral development consisted of three levels and seven stages.

The first two stages belong to the preconventional level, during which morality is externally defined. During stage 1, morality of punishment and obedience, children blindly obey authority and avoid punishment. When asked to decide what Heinz should do, children base their decisions on fears about being punished for letting one's wife die or committing a crime. During stage 2, morality of naïve instrumental hedonism, children's behaviour is guided egocentrically by the pleasantness or unpleasantness of its consequences to them. The moral choice is reduced to a weighing of the probable risks and benefits of stealing the drug.

The next two stages belong to the conventional level, which includes an understanding that the social system has an interest in people's behaviour. During stage 3, morality of maintaining good relations children want to be regarded by people who know them as good, well behaved children. Moral decisions are based on perceived social pressure. Either Heinz should steal the drug because otherwise people would regard him as heartless, or he should not steal it because they would regard him as a criminal. During stage 4, morality of maintaining social order, laws and moral rules are perceived as instruments used to maintain social order and, as such, must be obeyed. Thus, both protecting a life and respecting people's property are seen as rules that help maintain social order.

Kohlberg also described a final level of moral development – the postconventional level, during which people realise that moral rules have some underlying principles that apply to situations and societies. During stage 5, morality of social contracts, people recognise the rules are social contracts, that not all authority figures are infallible, and that individual rights can sometimes take precedence over laws. During stage 6, morality of universal ethical principles, people perceive rules and laws as being justified by abstract ethical values, such as the value of human life and the value of dignity. In stage 7, the morality of cosmic orientation, people adopt values that transcend societal norms. This stage represents the zenith of moral development. Kohlberg believed that not all people reach the postconventional level of moral development.

Although Kohlberg's theory has greatly influenced research on moral development, it has received some criticism. For example, Sobesky (1983) found that changes in the wording of Heinz's dilemma would drastically change people's responses. If the possibility of imprisonment were underscored, people tended to make more responses belonging to the preconventional level. Many researchers agree with Rest (1979) who

Gender Acquisition

There are a number of competing (and sometimes conflicting) theories that try to explain gender differences and gender role identity, in particular: the biological approach (Hutt, 1972); Biosocial Theory (Money and Ehrhardt, 1972); Freud's Psychoanalytic Theory; Social Learning Theory (Bandura, 1977) and cultural relativism (Mead, 1935).

Biologically sex is not an undimentional variable, there are at least three separate biological categories which can be distinguished, each constituting a (partial) definition: chromosomal sex, gonadal sex and hormonal sex. Females have two X (XX) chromosomes and males have an X an a Y (XY) and gonadal sex refers to the reproductive organs (ovaries in females and testes in males). The male hormones are androgens and the most important of which is testosterone (secreted by the testes). The ovaries, however, secrete two distinct types of female hormone, namely oestrogen and progesterone. While the number and range of hormones produced by males and females are virtually the same, females usually produce oestrogen and progesterone to a greater extent than males, whereas males produce a preponderance of testosterone and androgens, i.e. we all produce both male and female hormones but males produce more male hormones and females more female hormones.

Biosocial Theory, as the name suggests takes social factors into account in relation to biological ones. Specifically, it focuses on how babies of different temperaments contribute to their own development by influencing how others treat them; it is the interaction between biological and social factors that is important rather than the influence of biology directly.

According to Freud, however, several identity and sex roles are acquired when the Oedipus complex (for boys) or Electra complex (for girls) is resolved, at five or six years of age. The role of the traditional mother and father family unit (two parent family) is of crucial importance in Freud's theory of sexual development, whereby the child must identify with the same-sex parent.

Social learning theorist, emphasise the crucial role played by observational learning (learning from models) and reinforcement. Bandura et al (1961) found that boys were more likely to imitate aggressive male models than girls were. Maccoby and Jacklin criticised Bandura's ideas concluding from their findings that there is very little evidence, if any, that children will imitate same-sex models more than opposite-sex models.

The final viewpoint in gender acquisition to be considered is cultural relativism. This really represents that most direct challenge to the biological approach. If gender differences do reflect biological differences, then we would expect to find the same differences occurring in different cultures. Any differences that exist between cultures in relation to gender roles would tend to support the view that gender role is culturally determined (cultural relativism), that is, learned.

APPENDIX 21

Attachment Questions

1. Define attachment.

2. One factor that accounts for the differences in attachment styles is parenting practices. What is the second factor mentioned in the text?

3. Who was the psychoanalyst that pioneered most of the work on attachment in human infants in the 1950's and 1960's?

4. According to the above psychoanalyst, what happens if a child fails to form a secure attachment to one or more person in their early years?

5. According to the text, temperament might influence a child's competence at school. True or False.

6. What year was Mary Ainsworth's study?

7. During the experiment the primary caregiver remains in the room. True or False.

8. The baby is observed through a one-way mirror. Which **TWO** of the following observations are recorded?
   a. The baby's activity level and play involvement.
   b. Willingness to interact with the stranger.
   c. The baby's alertness.
   d. Attempts by the baby to leave the room.

9. Which of the types would describe a baby that may cry to be picked up and then squirm angrily to get down?

10. Avoidant babies appear _____ when the mother leaves the room. Please fill in the gap.
    a. very distressed
    b. not distressed
    c. comfortable
    d. clingy
    e. anxious

11. How does the author describe the term "sensitive responsiveness"?

12. Mothers of securely attached babies are more inclined to:
    a. cuddle and play with baby.
    b. be over-anxious with baby.
    c. be sensitive and responsive to baby.
    d. a and c.
    e. a, b and c.

Eyewitness Questions

1. Name one of the problems with eyewitness testimony that is identified in the text.

2. Who were the researchers involved in the 1974 study?

3. How many conditions were used in this experiment?

4. Identify each of these conditions.

5. The first group's mean estimate of speed was:
   a. 8.2
   b. 30.5
   c. 12.6
   d. 10.5
   e. 7.9

6. According to the text eyewitness evidence is easily distorted by:
   a. following information
   b. blood alcohol level
   c. distance from the incident
   d. amount of light at the incident
   e. number of people at the scene

7. What is the name of the new method that is used to gain information from witnesses?

8. Who originally came up with this new method?

9. Name the researchers who compared the new technique to the old in 1997.

10. How many retrieval techniques are applied when using this technique?

11. Please name one of these.

12. According to the text where has the technique been used successfully?

13. Why is the new technique more effective?
    a. emphasises physical appearance
    b. focuses on attentional processes
    c. applies memory research to a real life setting
    d. interrogation is used
    e. counselling techniques are applied

14. On average there is an increase of _____ per cent more information from adults when using this new technique, compared with control groups. Please fill in the gap.

Intelligence Questions

1. An IQ of ------- is used as the average score?

2. The earliest examples of intelligence tests were provided at the end of the 19th century by:
    a. Galton and Cattell.
    b. Stanford and Galton.
    c. Cattell and Weschler.
    d. Cattell, Colombo and Galton.

3. Who introduced the concept of intelligence quotient?

4. What is the formula for IQ?

5. Is this way of calculating IQ still used? Yes/No

6. Where does the 'Stanford' come from in the intelligence test's name 'Stanford-Binet'?

7. What does WISC stand for?

8. What criticism was launched against the Stanford-Binet that the WISC attempts to solve?

9. How does the WISC attempt to solve this problem?
    a. by reducing the mathematical content and increasing the language tasks
    b. by incorporating tasks such as manipulating blocks and pictures
    c. by reducing the amount of specialised comprehension tasks
    d. both a and b
    e. all of the above

10. What infant test was devised in 1969?

11. Scores from the above infant test correlate highly with intelligence tests administered later in life, such as the WISC and Stanford-Binet. True or False?

12. The British Ability Scales are designed for what age range?

13. In addition to traditional items found on intelligence tests, this test is concerned with:
    a. developmental and moral reasoning, and short-term memory
    b. motor abilities
    c. long-term memory
    d. pronunciation
    e. musical ability

Kohlberg Questions

1. What was the age range of the boys Kohlberg studied?

2. Kohlberg tested the same individuals at different stages of their youth. True or False.

3. What was Heinz's dilemma?

4. Kohlbergs theory was made up of:
    a. seven levels and three stages
    b. five stages and three levels
    c. eight stages
    d. one level in each of seven stages
    e. seven stages and three levels

5. What were Sobesky's findings?

6. Gilligan found that the judgements of males are based solely on concrete evidence. True or False.

7. Donenberg and Hoffman (1988) found that:
    a. girls and boys base their moral judgements on the potential legal consequences of the characters actions.
    b. girls base their moral decisions on caring and boys base their decisions on abstract ideas of justice.
    c. there is no difference between sexes in the way children make moral decisions.
    d. all the children regardless of sex believed the character should break the law for the good of another human being.

8. What was the very final conclusion of the piece of text regarding Gilligan's ideas?

9. What was the stage entitled 'morality of cosmic orientation' concerned with?
    a. the adoption of values that transcend societal norms.
    b. the value of human life
    c. the fallibility of authority figures.
    d. risks and benefits.
    e. instruments to preserve social order.

10. What number stage was the 'morality of cosmic orientation'?

11. What is stage two called?

12. Rest argued that the Kohlberg's stages could be seen distinct and separate as opposed to a continuous development. True or False.

13. What are the three levels that Kohlberg identified?

APPENDIX 22.

Answers for Attachment

1) The emotional tie that forms between one individual and another.

2) Inborn differences

3) Bowlby

4) An inability to develop **close** personal relationships in adulthood

5) True

6) 1979

7) False

8) A & B

9) Insecurely attached ambivalent

10) B

11) Mothers of the securely attached babies were inclined to be sensitive and responsive to their babies. They were more likely to cuddle and get involved with the babies play than those mothers of insecurely attached children.

12) D – (A&B)

13) A

14) True

15) Innately predisposed to form more secure attachments than others, respond more to being cuddled.

16) B

17) Enthusiastic, persistent, cooperative, curious, outgoing, socially involved, competent, appropriately independent.

18) A

19) Strange Situation

20) Attachment patterns may be a reflection of an interaction between the child's temperament and the parent's responsiveness.

Eyewitness Answers

1. accurate face recognition
   or
   difficulty of recall of other information relating to the event a
2. Loftus and Palmer
3. 3
4. smashed wording
   hit
   control group not asked about the speed of the cars
5. d
6. a
7. the cognitive interview
8. Geiselman et al
9. Gwyer and Clifford
10. 4
11. establishing the context in which the crime occurred
    retrieving details
    recalling events in a different order
    changing perspective
12. America, Europe and Australia
13. c
14. 35%
15. a
16. false
17. participants were responding to the experimental situation, arguing that cars that smash into each other would inevitably produce broken glass
18. 20 minutes – 1 week
19. pedestrian
20. Later information does influence the response of eyewitnesses.

Intelligence Answers

1. 100
2. a
3. Stern
4. see text
5. No
6. Stanford University where it was created
7. Weschler Intelligence Scale for Children
8. too reliant on language
9. b
10. Bayley Scales of Infant Development
11. false
12. 2-17 yrs
13. a
14. c
15. to identify children needing special educational help
16. d
17. b
18. WAIS Weschler Adult Intelligence Scales
19. Simon-Binet
20. Before the 1986 revision, the IQ score was derived from an amalgam of all the items and did not reflect differences between a child's performance in eg numerical and verbal ability.

Kohlberg Answers

1. 10-17
2. true
3. whether he should steal a drug (or not) to save his dying wife
4. e
5. **1 mark** – changes in the wording of Heinz's dilemma drastically change people's responses.
   1 mark – if the possibility of imprisonment is highlighted people tend to make more responses belonging to the preconventional level
6. false
7. c
8. available evidence does not indicate there are sex differences in moral reasoning and judgements
9. a
10. 7
11. morality of naïve instrumental hedonism
12. false
13. preconventional, conventional, postconventional
14. true
15. Sobesky
16. stage 7, morality of cosmic orientation
17. 233
18. 5-63
19. conventional
20. postconventional

APPENDIX 23.

EYEWITNESS – After	
Name:	
1	
2	
3	
4	
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18	
19	
20	

APPENDIX 24

PILOT MMAP Main

A	E	I	K	L	P
1	2	3	4	5	6
12	11	17	16	7	12
10	13	1	11	8	15
15	16	13	20	9	12
9	13	13	11	10	7
13	15	8	13	6	8
11	13	14	15	4	11
15	10	13	13	10	9
15	9	10	11	16	14
18	11	9	14	12	7
11	15	16	15	9	12
17	15	11	16	10	
11	9	8	10		
14		9			
no of responses	13	12	13	12	11	10
average	13.15	12.50	10.92	13.75	9.18	10.70
range	9	7	16	10	12	8
standard dev	2.76	2.47	4.17	2.86	3.16	2.83
Possible total	21	20	20/19	21	21	20

Question Type	Attachment	Eyewitness	Intelligence	Kohlberg
Deep	7	8	6	8
Surface	13	12	14	12
Open	11	16	12	13
Closed	9	4	8	7

Questions were presented in the order that they appeared in the text

ATTACHMENT

														Question Total	% Correct	Question Type	
1	1	1	1	0	1	1	1	1	1	1	1	1	1	**12**	**92%**	**DO**	1
2	1	1	1	1	1	0	1	1	1	1	1	1	1	**12**	**92%**	**SC**	
3	1	1	1	0	1	1	1	1	1	1	1	0	1	**11**	**85%**	**SO**	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	**13**	**100%**	**DO**	1
5	1	0	1	0	1	1	1	1	1	1	1	1	0	**10**	**77%**	**SO**	1
6	1	0	0	0	0	1	0	1	1	1	0	1	1	**7**	**54%**	**SO**	1
7	1	1	1	1	1	0	1	1	1	1	1	1	1	**12**	**92%**	**DC**	1
8	1	1	1	1	0	1	1	0	1	0	1	0	1	**9**	**69%**	**SC**	
9	1	1	0	0	0	0	0	0	1	0	0	0	1	**4**	**31%**	**SO**	1
10	0	1	1	1	1	0	1	1	1	0	1	1	1	**10**	**77%**	**SC**	
11	0	0	1	0	0	0	1	0	1	0	1	0	1	**5**	**38%**	**DO**	1
12	0	0	0	1	0	1	0	0	0	1	0	0	0	**3**	**23%**	**SC**	
13	1	1	1	1	1	1	1	1	1	0	1	1	0	**11**	**85%**	**SC**	
14	0	0	1	0	1	0	0	1	1	1	0	0	0	**5**	**38%**	**SO**	1
15	0	0	0	0	0	0	1	0	0	0	1	0	0	**2**	**15%**	**DO**	1
16	1	0	1	0	1	1	1	1	1	0	1	1	1	**10**	**77%**	**SC**	
17	1	1	2	0	2	0	2	2	2	1	2	1	2	**18**	**138%**	**SO**	1
18	0	0	0	1	0	1	0	1	1	0	1	0	0	**5**	**38%**	**DC**	
19	0	0	1	1	1	1	1	1	0	1	1	1	1	**10**	**77%**	**SC**	
20	1	0	0	0	0	0	0	0	1	0	1	0	0	**3**	**23%**	**DO**	1
Person Total	**12**	**10**	**15**	**9**	**13**	**11**	**15**	**15**	**18**	**11**	**17**	**11**	**14**				

EYEWITNESS

													Question Total	% Correct	Question Type
1	1	1	1	1	1	1	1	1	1	1	1	1	12	100%	DC
2	0	1	1	0	1	1	1	0	1	0	1	1	8	67%	DO
3	1	1	1	1	1	0	0	0	1	1	0	0	7	58%	SO
4	1	1	1	1	1	1	1	0	1	1	1	1	11	92%	SO
5	1	1	1	1	0	1	0	0	1	1	1	1	9	75%	DO
6	1	1	1	0	1	1	1	1	1	1	1	1	11	92%	DC
7	1	1	1	1	1	1	0	0	1	1	1	1	10	83%	SO
8	1	1	1	1	1	1	1	1	1	1	1	0	11	92%	DC
9	0	0	0	1	0	0	0	1	0	1	1	0	4	33%	DO
10	0	1	1	1	1	1	1	1	1	0	1	1	10	83%	SO
11	1	1	1	1	1	1	0	1	0	1	1	1	10	83%	SO
12	0	0	1	0	0	1	0	0	0	1	0	0	3	25%	DO
13	0	0	1	1	1	1	1	1	0	1	1	0	8	67%	SO
14	0	0	0	1	1	0	0	0	0	1	1	0	4	33%	SO
15	1	1	1	1	1	1	1	1	1	1	1	1	12	100%	SO
16	1	1	1	0	1	0	0	0	1	1	0	0	6	50%	SO
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	SO
18	0	1	1	0	1	0	0	1	0	1	1	0	6	50%	SO
19	0	0	0	0	0	1	1	0	0	0	1	0	3	25%	DC
20	1	0	1	1	1	0	1	0	0	0	0	0	5	42%	SO
Person Total	11	13	16	13	15	13	10	9	11	15	15	9			

INTELLIGENCE

														Question Total	% Correct	Question Type
1	1	0	0	0	0	0	1	0	0	0	0	0	0	2	15%	DO
2	1	1	1	1	1	1	1	0	1	1	1	0	1	11	85%	SC
3	1	0	1	0	0	1	0	1	0	1	1	0	1	7	54%	SO
4	0	0	0	1	0	1	1	1	1	1	1	1	0	8	62%	SO
5	1	0	1	1	1	1	1	1	1	1	1	1	1	12	92%	SC
6	1	0	1	1	0	0	1	0	0	1	1	1	1	8	62%	SO
7	1	0	0	0	0	1	0	0	1	1	0	0	0	4	31%	SO
8	1	0	1	0	0	1	1	0	0	1	0	0	1	6	46%	DO
9	1	0	0	0	1	1	1	1	0	1	1	1	1	9	69%	DC
10	1	0	0	0	0	0	0	0	0	0	0	0	0	1	8%	SO
11	1	0	1	1	0	1	1	1	1	1	1	1	0	10	77%	DC
12	1	0	1	1	0	1	1	1	0	1	0	0	0	7	54%	SO
13	1	0	1	1	1	1	0	1	1	1	0	1	1	10	77%	DC
14	1	0	1	1	1	1	1	0	1	1	1	0	0	9	69%	DC
15	1	0	1	1	0	0	0	0	0	0	0	0	0	3	23%	SO
16	1	0	1	1	1	1	1	0	0	1	0	0	0	7	54%	SC
17	1	0	1	1	1	1	0	1	1	1	1	1	1	11	85%	SC
18	0	0	0	0	0	0	0	1	0	0	0	0	0	1	8%	SO
19	1	0	1	1	1	1	1	1	1	1	1	1	1	12	92%	SO
20	0	0	0	1	0	0	1	0	0	1	1	0	0	4	31%	SO
Person Total	17	1	13	13	8	14	13	10	9	16	11	8	9			

KOHLBERG

													Question Total	% Correct	Question Type
1	1	1	1	1	1	1	1	1	1	1	1	1	12	100%	SO
2	1	1	1	1	1	1	1	0	1	1	1	1	11	92%	DC
3	1	0	1	1	1	1	1	1	0	1	0	1	9	75%	DO
4	1	1	1	0	1	1	1	1	1	1	1	1	11	92%	SC
5	1	1	1	0	1	1	1	1	1	1	0	0	9	75%	DO
6	0	0	1	1	1	1	1	1	0	1	1	0	8	67%	DC
7	1	1	1	1	0	1	1	1	1	1	1	1	11	92%	DC
8	1	0	1	1	0	0	0	0	1	0	1	0	5	42%	DO
9	1	1	1	1	1	1	0	1	0	1	1	1	10	83%	DC
10	1	0	1	0	0	1	0	1	0	0	1	0	5	42%	SO
11	1	0	0	0	0	0	0	0	0	0	0	0	1	8%	SO
12	1	1	1	0	1	1	0	1	1	1	0	1	9	75%	DC
13	1	1	1	1	1	1	1	1	1	1	1	1	12	100%	SO
14	1	1	1	1	1	0	1	0	1	1	1	1	10	83%	SC
15	0	0	1	0	0	1	1	1	1	0	0	0	5	42%	SO
16	1	1	2	0	1	0	1	0	1	2	2	0	11	92%	SO
17	1	1	1	1	0	1	0	0	1	1	1	0	8	67%	SO
18	1	0	1	0	0	1	0	0	1	0	1	0	5	42%	SO
19	0	0	1	0	1	0	1	0	0	1	1	0	5	42%	SO
20	0	0	1	1	1	1	1	0	1	0	1	1	8	67%	SO
Person Total	16	11	20	11	13	15	13	11	14	15	16	10			

LANGUAGE

											Question Total	% Correct
1	1	0	1	1	0	1	1	0	0	1	6	60%
2	1	1	1	0	0	1	0	1	0	0	5	50%
3	1	1	1	0	1	1	1	1	1	0	8	80%
4	0	0	0	1	0	1	0	0	0	1	3	30%
5	0	0	0	0	0	1	1	1	0	0	3	30%
6	0	0	1	1	0	0	0	1	0	0	3	30%
7	0	0	0	0	1	0	1	0	1	0	3	30%
8	1	1	0	1	0	0	1	0	0	1	5	50%
9	0	0	0	1	0	1	1	1	0	0	4	40%
10	1	0	1	1	0	0	1	1	1	1	7	70%
11	0	2	0	0	0	0	1	1	2	2	8	80%
12	1	0	1	0	0	0	1	1	0	1	5	50%
13	0	1	1	0	0	0	0	0	0	0	2	20%
14	0	0	0	0	1	0	1	0	0	1	3	30%
15	0	1	1	0	1	1	1	0	1	0	6	60%
16	0	0	0	0	0	1	1	1	0	0	3	30%
17	0	0	0	0	0	0	1	1	1	0	3	30%
18	1	1	1	0	0	0	1	1	1	1	7	70%
19	1	1	1	0	0	1	1	1	1	1	8	80%
20	0	0	0	0	0	1	1	0	0	0	2	20%
Person Total	8	9	10	6	4	10	16	12	9	10		

PERSONALITY

											Question Total	% Correct	Question Type
1	1	1	1	1	1	1	0	1	0	1	8	80%	
2	1	1	1	1	1	1	1	0	0	1	8	80%	
3	0	1	1	1	0	1	1	1	0	1	7	70%	
4	1	1	0	1	0	1	0	1	1	1	7	70%	
5	1	1	0	0	0	1	1	1	1	1	7	70%	
6	0	1	1	1	1	1	0	1	0	1	7	70%	
7	1	1	0	1	1	1	1	0	1	1	8	80%	
8	0	0	0	0	0	0	0	0	0	0	0	0%	
9	0	1	1	1	1	1	1	1	1	1	9	90%	
10	0	0	1	0	0	0	0	1	0	0	2	20%	
11	1	1	0	0	0	0	0	1	0	1	4	40%	
12	1	0	0	0	0	0	0	0	0	0	1	10%	
13	1	1	1	0	1	1	1	1	1	1	9	90%	
14	0	1	1	0	0	1	1	1	0	1	6	60%	
15	0	1	1	0	0	0	0	1	1	1	5	50%	
16	0	0	0	0	0	0	0	0	0	0	0	0%	
17	1	1	0	0	0	0	0	1	0	0	3	30%	
18	1	1	1	0	1	0	1	1	0	0	6	60%	
19	1	0	1	0	1	0	0	0	0	0	3	30%	
20	1	1	1	0	0	1	1	1	1	0	7	70%	
Total	12	15	12	7	8	11	9	14	7	12			

APPENDIX 2S.

Language

Attempts have been made over many years to show that the use of language was not a species-specific attribute of humans but was a result of human intelligence. It was argued that if this was the case it ought to be possible to teach animals who were close to humans on the phylogenetic scale (chimpanzees and Gorillas particularly) to use language. An early attempt by the Kelloggs (Kellogg and Kellogg, 1993) was a complete failure. The chimpanzee "Gua" was not able to utter a single word despite being brought up with the Kelloggs own child and being treated exactly alike. She was however, capable of understanding about 70 words or commands.

Keith and Cathy Hayes (Hayes and Hayes 1952) used operant conditioning (positive reinforcement) to teach their chimpanzee, Vicki, to talk. This too seems to have been a failure. The problem was that chimpanzees lack the vocal apparatus to make the sounds of human speech. Taking account of this, a number of researchers began a different approach.

Gardner and Gardner (1972) taught a female chimpanzee named Washoe signs adapted from American Sign Language. They first taught her signs by shaping procedures, waiting for her to make a gesture that resembled a sign and then reinforcing it. Later Washoe learned signs simply by observing and imitating. By the age of 4 she could produce 130 different signs and understand even more.

Other chimpanzees that were studied acquired comparable vocabularies. Some of the studies used methods of manual communication other than sign language. For example, Premack (1971; 1983) taught chimpanzee named Sarah to use plastic symbols as words and to communicate by manipulating these symbols. She made significant progress and certainly seemed to have some understanding of the relationship between the symbols and the meanings they represented. She could arrange coloured cards to correspond with a sentence or construct a sentence to describe the way the cards were arranged. She was able to follow commands from a sentence of symbols that represented such things as "Sarah, put the banana in the pail and the apple in the dish". In a series of similar studies, Patterson (1978) taught sign language to a gorilla named Koko, starting when Koko was a year old. By the age of 10 Koko had a vocabulary of more than 400 signs.

Do these studies prove that apes can learn human language? There seems little doubt that the apes' signs are equivalent to our words and that concepts behind some of these signs are equivalent to ours. But there are grave doubts about these studies showing that apes can learn to combine signs in the manner that humans combine words into a sentence. Firstly evidence has shown that the utterances of an ape are often highly repetitious. In the cases in which an ape utterance is more like a sentence, the ape may have simply been imitating the sequence of signs made by its human teacher. Secondly many of the gestures learnt by the apes are those, which are natural to apes in any case. There is a great deal of overlap in the gestural repertoire of those apes in the studies and untrained apes.

However a recent study seems to challenge these conclusions (Greenfield & Savage-Rumbaugh, 1990). The subject, a 7 year old pygmy chimpanzee named Kanzi, communicates by manipulating symbols that stand for words. Unlike the cases in

previous studies Kanzi learned to manipulate the symbols in a relatively natural way. by listening to his caretakers as they uttered English words while pointing at the symbols. Most importantly after a few years of language training, Kanzi demonstrates some ability to vary word order to communicate changes in meaning. Kanzi seems to have syntactic knowledge, roughly that of a 2 year old human.

These results need to be interpreted with caution, so far Kanzi is the only chimp who's shown any syntactic ability; hence, there is a question of how general the results are. Also it took Kanzi considerably longer to reach the linguistic ability than the two years it takes a human child to reach that level. We do not know if Kanzi or any other chimpanzee can get much beyond that point. It is difficult to imagine that an animal with the capacity for something as biologically advantageous as language would not have used it by now.

Questions

1. How did the Kellogs attempt to introduce language to the Chimp "Gua"?

2. How many words could Gua understand?

3. Why did Hayes and Hayes' attempt to teach "Vicky" fail?

4. What was the different approach taken by Gardner and Gardner in 1972?
   a) They used operant conditioning
   b) They used coloured cards
   c) They used American Sign Language
   d) A + B
   e) A + C

5. Explain how this different approach (used to teach Washoe language) works.

6. How many words did Washoe understand at the age of four?

7. How did the chimp "Sarah" trained by a psychologist in 1971 communicate?

8. Who was the psychologist who trained "Sarah"?

9. What species was Koko?

10. By the age of ten how many signs did "Koko" have in his vocabulary?
    a. more than 200
    b. more than 300
    c. more than 400
    d. more than 500

11. Apes can learn to combine signs in the manner that humans combine words into a sentence. What two criticisms are cited in the text against this statement?

12. What kind of chimp was Kanzi?

13. How old was Kanzi as cited in the text?

14. What language did Kanzi's trainers speak according to the text?

15. What was the year in which Greenfield and Savage-Rumbaugh carried out their research with "Kanzi"?
    B) 1989
    C) 1990
    D) 1999
    E) 2000

16. What can "Kanzi" do that other chimps are involved in research so far have been unable to do?

17. Explain why the results of work with "Kanzi" need to be treated with caution?

18. Research has shown that it is possible to teach a chimp language to the level of a _____ year old child. Please fill in the gap.

19. Chimps learn language at the same rate as children. True or false.

20. What is the very final conclusion of the text?

Personality

Do traits or situations best predict behaviour?

Social Learning theorists stress the importance of the environment as an influence on behaviour and tend to place less emphasis on the role of personality traits. They argue that the situation often plays a strong role in determining behaviour. In contrast, trait theorists argue that personality traits are stable characteristics of individuals and that knowing something about these traits permits us to predict an individual's behaviour.

Mischel (1968, 1976) has suggested that stable personality traits do not exist – or if they do, they are of little importance. Situations, not traits, best predict behaviour. He asks us to consider two situations: a party to celebrate someone's winning a large sum of money and a funeral. People will be much more talkative, cheerful and outgoing at the party than at the funeral. How much will knowing a person's score on a test of introversion-extroversion enable you to predict whether he or she will be talkative and outgoing? In this case, knowing the situation has much more predictive value than knowing the test score.

Mischel cites several studies in support of his position. One of the first of these studies was performed over seventy years ago. Hartshorne and May (1928) designed a set of behavioural tests to measure the traits of honesty and self-control and administered them to over ten thousand students in elementary school and high school. The tests gave the children the opportunity to be dishonest – for example, to cheat on a test, lie about the amount of homework they had done, or keep money with which they had been entrusted. In all cases, the experimenters had access to what the children actually did, so they could determine whether the child acted honestly or dishonestly. They found that a child who acted honestly (or dishonestly) in one situation did not necessarily act the same way in a different situation. The average correlation of a child's honesty from situation to situation – the cross-situational consistency- was below 0.3. The authors concluded that 'honesty or dishonesty is not a unified character trait in children of the ages studied, but a series of specific responses to specific situations' (p. 243).

Mischel reviewed evidence from research performed after the Hartshorne and May study and found that most personal characteristics showed the same low cross-situational consistency of 0.3 or lower. He concluded that the concept of a personality trait was not useful. People's behaviour was determined by the situations in which they found themselves, not by any intrinsic personality traits.

Other psychologists disagreed with Mischel. For example, Epstein (1979) noted that personality traits are more stable than some of these measures had suggested. He noted that assessments of cross-situational consistency usually test a group of people on two occasions and correlate their behaviour in one situation with their behaviour in the other. He showed that repeated measures over several days yielded much higher correlations. In a study of his own, a group of twenty-eight undergraduates, kept records of their most pleasant and most unpleasant experiences for a month. For each experience, they recorded the emotions they felt, their impulses to action and their actual behaviour. The correlation between a person's emotions, impulses, or behaviour on any two days was rather low – of the order of 0.3. However, when he

rouped measurements (that is. correlated the ratings obtained on odd-numbered days ith those obtained on even- numbered days), the correlation rose dramatically - up to round 0.8.

ersonality and situations are usually conceived of as independent variables, but they re not always independent. In laboratory settings, experimenters assign people to arious situations. Here, situation and personality are truly independent. However, as em and Allen (1974) pointed out, people in life outside the laboratory are able to xert some choice over the situations they enter. For instance, a party is a moderately owerful situation and tends to produce extroverted behaviours. Introverted people ay stay away from parties to avoid situations that encourage behaviours with which ey are not comfortable. The fact that people may choose their own situations means at personality traits interact with situations

cknowledging the stability of personality over many situations and the interaction etween personality and situations, most psychologists agree that the original question Which is more important in determining a person's behaviour, the situation or ersonality traits?' has proved too simplistic. Some types of personality trait will revail in most situations; some situations will dictate the behaviour of most people. ut some interactions between situation and personality require the analysis of both ariables.

Questions for Personality

1. Social learning theorists stress the importance of the role of personality traits as an influence on behaviour. True or False?

2. Which theorist, cited in the text, does not believe that personality traits exist?

3. This theorist argues that situations have a greater predictive value. What example is used to illustrate this point?

4. How many children were involved in the Hartshorne and May experiment in 1928?
   a. 2000
   b. 4000
   c. 6000
   d. 10,000

5. Hartshorne and May studied children in:
   a. pre-school
   b. elementary school
   c. high school
   d. a and b
   e. b and c
   f. a, b and c

6. What are the opportunities given to children to be dishonest in Hartshorne and May's study?

7. What did Hartshorne and May conclude from the findings of their experiment?

8. What is cross-situational consistency?

9. What was the correlation figure of cross-situational consistency for most personal characteristics?
   a. 0.3
   b. 0.5
   c. 0.1
   d. 1.0

10. What did Epstein point out regarding the way the experiments were carried out?

11. What year did Epstein note this?

12. How did his own experiment challenge the results obtained by Hartshorne and May, and Mischel?

13. Epstein studied 28 undergraduates. True or False.

14. What did Epstein require his participants to record?

15. How long did he require them to do this?

16. What did Epstein correlate in his study?

17. Explain Bem and Allen's (1974) argument.

18. How do Bem and Allen use an example to illustrate this point?

19. What are the conclusions drawn within the text from the statement "which is more important in determining a person's behaviour, the situation or personality traits"?

20. According to the text, an individual's score on a questionnaire measuring self-control has an important role in predicting behaviour. True or False.